MATH M03: INTERMEDIATE ALGEBRA

Originator
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College
Moorpark College

Discipline (CB01A)
MATH - Mathematics

Course Number (CB01B)
M03

Course Title (CB02)
Intermediate Algebra

Banner/Short Title
Intermediate Algebra

Credit Type
Credit

Start Term
Fall 2023

Catalog Course Description
Reviews briefly linear equations and inequalities, graphing, factoring, and rational expressions. Covers systems of linear equations, rational functions, complex fractions, rational exponents and radicals, complex numbers, quadratic equations, graphs of parabolas, functions, composition and inverse functions, exponential and logarithmic functions.

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)
C (Not transferable)

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)
A - One level below transfer

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)
C - Satisfies AA/AS Analytical Thinking/Mathematics competency

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
87.5
Maximum Contact/In-Class Lecture Hours
87.5

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
87.5
Total Maximum Contact/In-Class Hours
87.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
175
Maximum Outside-of-Class Hours
175

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
262.5
Total Maximum Student Learning Hours
262.5

Minimum Units (CB07)
5
Maximum Units (CB06)
5

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

Entrance Skills
Entrance Skills

- graph a line of the form $ax+by=c$.
- factor a quadratic expression of the form x^2+bx+c.
- solve a linear equation of the form $ax+b=cx+d$.

Requisite Justification
Requisite Type
Prerequisite

Requisite
Elementary Algebra (Algebra I)

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Content review

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	analyze and solve various equations, inequalities, and systems of equations.
2	graph and interpret linear and quadratic functions.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	solve linear and literal equations for a specified variable.
2	solve absolute value equations and absolute value inequalities.
3	determine if a relation is a function using the vertical line test and identify the domain.
4	graph linear equations and test whether two lines are parallel, perpendicular, or neither.
5	write the equation of a line in point-slope form, slope-intercept form, and standard form.
6	solve a system of equations in three variables by substitution or by the elimination method and solve applications.
7	factor polynomials including the sum and difference of cubes.
8	evaluate polynomial functions and solve polynomial equations by factoring and using the zero factor property.
9	simplify rational expressions, perform operations with rational expressions, simplify complex fractions, and determine the domain of a simple rational function.
10	divide by a polynomial using long division.
11	solve equations containing rational expressions and applications.
12	simplify rational exponent expressions using the properties of exponents and convert to radical notation.
13	put radical expressions into simplest radical form, perform operations with radicals, solve equations containing radical expressions, and determine domain of a simple radical function.
14	add, subtract, multiply and divide complex numbers.
15	solve quadratic equations by each of the following methods where applicable: factoring, the square root method, completing the square, and the quadratic formula.
16	solve equations that are in quadratic form and solve quadratic equations involving radicals and substitution.
17	solve non-linear inequalities in one variable.
18	graph quadratic functions showing the vertex and intercepts.
19	find the sum, difference, product, quotient, and composition of two functions.
20	identify one-to-one functions and use the horizontal line test to determine whether or not a function is one-to-one, and find the inverse of a one-to-one function.
21	describe the relationship between the function and its inverse geometrically and algebraically.
22	graph exponential and logarithmic functions, and convert equations from exponential form to logarithmic form and vice versa.
23	use logarithmic properties to rewrite logarithmic expressions and solve logarithmic and exponential equations and related applications.

Course Content

Lecture/Course Content

5% A. Equations, Inequalities, and Problem Solving
 1. Review of linear equations and their applications in one variable
 2. Formulas and literal equations
 3. Absolute value equations and inequalities

10% B. Graphs and Functions
 1. Introduction to linear and non-linear functions

2. Review of graphs of linear equations and slope
3. Equations of linear functions

5% C. Systems of Equations
1. Review of systems of linear equations in two variables and their applications
2. Solving systems of linear equations in three variables and their applications

10% D. Integer Exponents, Polynomials, and Polynomial Functions
1. Review of integer exponents, exponent rules, and conversions in scientific notation
2. Review of polynomials and operations on polynomials
3. Review of factoring
4. Factoring sums and differences of two cubes
5. Solving polynomial equations by factoring
6. Evaluate polynomial functions

20% E. Rational Expressions
1. Simplifying, adding, subtracting, multiplying, and dividing rational expressions
2. Simplifying complex fractions
3. Dividing polynomials using long division
4. Synthetic division and the remainder theorem (optional*)
5. Solving rational equations and applications

15% F. Radicals, Rational Exponents, and Complex Numbers
1. Radicals and radical functions
2. Rational exponents
3. Simplifying, adding, subtracting, and multiplying radical expressions
4. Dividing radical expressions and rationalizing denominators
5. Radical equations
6. Complex numbers

15% G. Quadratic Equations and Functions
1. Solving quadratic equations by the square root method, completing the square and the quadratic formula
2. Solving equations that are quadratic in form
3. Non-linear inequalities
4. Rational inequalities (optional*)
5. Graphing quadratic functions

5% H. Additional Function Topics
1. Sums, differences, products, and quotients of functions
2. Composition of functions
3. One-to-one functions
4. Inverse functions

15% I. Exponential and Logarithmic Functions
1. Exponential functions
2. Logarithmic functions
3. Properties of logarithms
4. Common and natural logarithms
5. Exponential and logarithmic equations

*Optional topics should be covered if time allows, but may be omitted without loss of continuity in the mathematics program. Enrichment topics related to the study of MATH M03 also may be presented by the instructor, if time allows.

Laboratory or Activity Content

n/a

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)

Classroom Discussion
Projects

Other

Quizzes and/or graded work as well as group 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 solving a system of equations.
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. Assigning homework problems selected from the intermediate algebra textbook where answers require a written explanation of the solution, such as solving a system of linear equations and identifying if the system is consistent or inconsistent, dependent or independent.

2. Writing short answer problems on exams, such as stating the results for an application problem such as solving a motion problem requiring input of distance, rate and time.

3. 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.

Critical Thinking Assignments

1. Describe and apply the algorithmic steps for obtaining the solution to a mathematical problem, such as solving logarithmic equations.

2. Interpret and describe the meaning of the solution to a mathematical application problem, such as finding the inverse of a one-to-one function.

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 and the vertex in the graphs of quadratic functions.
3. Reading resource materials from the library or online concerning real-life applications of exponents and logarithms in economics and the sciences.

Skills Demonstrations

1. Demonstration of computational skills such as factoring or simplifying mathematical expressions.

2. Demonstration of understanding 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 proper labeling.

2. Compare and contrast different models of solving mathematical problems, such as solving quadratic equations by more than one method.

Outside Assignments

Representative Outside Assignments

1. Group or individual assignments which require student collaboration including written mathematical answers on paper or on the board, such as solving rational equations.

2. Graded assignments, such as problem sets on solving linear systems in two variables by elimination and substitution methods, or problem sets on determining all solutions to logarithmic equations and eliminating extraneous solutions.

3. Additional problem sets provided by the instructor, such as practice exercises on simplifying radicals and rationalizing denominators.

Articulation

Comparable Courses within the VCCCD

MATH V03 - Intermediate Algebra
MATH R014 - Intermediate Algebra

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
LA Mission College	MATH 125	Intermediate Algebra	5
Cerritos College	MATH 80	Intermediate Algebra	4
San Jose City College	MATH 013	Intermediate Algebra	5

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

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

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:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

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
Blitzer, Robert F. *Intermediate Algebra for College Students.* 8th ed., Pearson, 2021.

Resource Type
Textbook

Classic Textbook
No

Description
Miller, Julie, Molly O'Neill, and Nancy Hyde. *Intermediate Algebra.* 6th ed., McGraw-Hill, 2022.

Resource Type
Textbook

Classic Textbook
No

Description

Martin-Gay, Elayn. *Intermediate Algebra*. 8th ed., Pearson, 2023.

Resource Type

Textbook

Description

Marecek, Lynn, and Andrea Honeycutt. *Intermediate Algebra.* E-book, OpenStax (Rice University), 2022, https://openstax.org/details/books/intermediate-algebra-2e. Accessed 30 Sept 2022.

Library Resources

Assignments requiring library resources

Textbooks on reserve in the Library. Other textbooks in the Library collection for an assignment that may require additional research for application problems such as current interest rates, motion problems related to science or engineering, or a mixture problem involving percentages.

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.

| 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. |
| 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. |

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.
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.
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.

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.
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.
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.
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.

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
CCC000434592

DOE/accreditation approval date
MM/DD/YYYY