

College of San Mateo
Official Course Outline

1. COURSE ID: MATH 123 **TITLE:** Intermediate Algebra II

Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours

Method of Grading: Letter Grade Only

Prerequisite: MATH 122

Recommended Preparation:

MATH 115 and READ 830

2. COURSE DESIGNATION:

Degree Credit

Transfer credit: none

AA/AS Degree Requirements:

CSM - COMPETENCY REQUIREMENTS: C1 Math/Quantitative Reasoning Basic Competency

CSM - GENERAL EDUCATION REQUIREMENTS: E2c.Communication and Analytical Thinking

3. COURSE DESCRIPTIONS:

Catalog Description:

Covers the second half of MATH 120 - a comprehensive review of elementary algebra with certain topics studied in greater depth. Extension of fundamental algebraic concepts and operations; problem solving and applications; linear, quadratic, rational, and radical equations; equations in two variables; graphs; systems of equations; complex numbers; review of exponential and logarithmic functions; sequences and series. Math 122 and 123 together are equivalent to Math 120.

4. STUDENT LEARNING OUTCOME(S) (SLO'S):

Upon successful completion of this course, a student will meet the following outcomes:

1. Identify and apply basic algebraic concepts including function and its properties (domain, range, intercepts, inverse function). slope and its meaning (rate of change); absolute value, equations and equivalency of equations. inequalities, exponents, laws of exponents and logarithms; Pythagorean Theorem, distance and midpoints.
2. Perform basic operations on and simplify expressions containing algebraic expressions: Complex numbers, Polynomial expressions, Exponential expressions, Logarithmic expressions, Radical expressions, Rational expressions.
3. Solve equations and inequalities: Equations in one or two variables; Inequalities in one variable; Systems of linear equations in two or three unknowns using elimination, substitution and graphing; Quadratic equations by factoring, completing the square, and quadratic formula; for real and complex roots; Simple exponential and logarithmic equations; Equations involving radicals; Equations involving rational expressions.
4. Sketch the graphs of functions and relations: Algebraic, including linear equalities and inequalities, polynomial, rational; Radical; Logarithmic; Exponential; Circles.
5. Find and sketch inverse functions.
6. Solve problems by application of linear, exponential and quadratic functions.

5. SPECIFIC INSTRUCTIONAL OBJECTIVES:

Upon successful completion of this course, a student will be able to:

1. Identify and apply basic algebraic concepts, including functions and their properties (domain, range, intercepts, inverse functions); slope and its meaning (rate of change); absolute value; equations and equivalency of equations; inequalities; laws of exponents and logarithms; Pythagorean Theorem, distance, and midpoints.
2. Perform basic operations on and simplify expressions containing algebraic expressions; Complex numbers; Polynomial, Exponential, Logarithmic, Radical, and Rational expressions.
3. Solve equations and inequalities: Equations in one or two variables; Inequalities in one variable; Systems of linear equations in two or three unknowns using elimination, substitution, and graphing; Solving quadratic equations by factoring, completing the square, and the quadratic formula; Real and complex roots; Simple exponential and logarithmic equations; Equations involving radicals; Equations involving rational expressions
4. Sketch the graphs of functions and relations, including: Algebraic, including linear equalities and inequalities, polynomial, and rational graphs; Logarithmic and Exponential graphs; Circles.

5. Find and sketch inverse functions.
6. Solve application problems involving linear, exponential, logarithmic, and quadratic functions.

6. COURSE CONTENT:

Lecture Content:

Topics Introduced in Math 122 and reviewed as appropriate in Math 123

1. **Linear Equations and Linear Functions**
2. **Modeling with Linear Functions**
3. **Systems of Linear Equations**
4. **Exponential Functions**
5. **Logarithmic Functions**

Topics introduced in Math 123

1. **Polynomial Functions**
 - A. Adding and Subtracting Polynomial Expressions and Functions
 - B. Multiplying Polynomial Expressions and Functions
 - C. Factoring Trinomials of the Form $x^2 + bx + c$; Factoring Out the GCF
 - D. Factoring Polynomials
 - E. Factoring Special Binomials; A Factoring Strategy
 - F. Using Factoring to Solve Polynomial Equations
2. **Quadratic Functions**
 - A. Graphing Quadratic Functions in Vertex Form
 - B. Graphing Quadratic Functions in Standard Form
 - C. Using the Square Root Property to Solve Quadratic Equations
 - D. Solving Quadratic Equations by Completing the Square
 - E. Using the Quadratic Formula to Solve Quadratic Equations
 - F. Solving Systems of Linear Equations in Three Variables; Finding Quadratic Functions
 - G. Finding Quadratic Models
 - H. Modeling with Quadratic Functions
3. **Rational Functions**
 - A. Finding the Domains of Rational Functions and Simplifying Rational Expressions
 - B. Multiplying and Dividing Rational Expressions
 - C. Adding and Subtracting Rational Expressions
 - D. Simplifying Complex Rational Expressions
 - E. Solving Rational Equations
 - F. Modeling with Rational Functions
 - G. Variation
4. **Radical Functions**
 - A. Simplifying Radical Expressions
 - B. Adding, Subtracting, and Multiplying Radical Expressions
 - C. Rationalizing Denominators and Simplifying Quotients of Radical Expressions
 - D. Graphing and Combining Square Root Functions (optional)
 - E. Solving Radical Equations
 - F. Modeling with Square Root Functions (optional)
5. **Other**
 - A. Pythagorean theorem
 - B. Performing Operations with Complex Numbers (optional)
 - C. Distance Formula, and Circles (optional)
 - D. Ellipses and Parabolas (optional)
 - E. Solving Nonlinear Systems of Equations (optional)

7. REPRESENTATIVE METHODS OF INSTRUCTION:

Typical methods of instruction may include:

- A. Lecture
- B. Other (Specify):
 - a. Out-of-class assignments: students will need to complete assigned problems and projects.
 - b. Reading assignments: Instructor will assign text readings prior to discussion of a topic in class.
 - c. Writing assignments:
 - a. Students will submit written homework assignments.
 - b. Students may be assigned papers including mathematical modeling.
 - d. Critical thinking:
 - a. Lecture/discussion to understand problem solving process
 - b. Students will practice critical thinking in small group problem solving
 - c. Students will evaluate proposed solutions in light of constraints of the problem

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students will submit written homework assignments. Students may be assigned papers including mathematical modeling.

Reading Assignments:

Instructor will assign text readings prior to discussion of a topic in class.

Other Outside Assignments:

Students will need to complete assigned problems and projects.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Class Participation
- B. Exams/Tests
- C. Group Projects
- D. Homework
- E. Quizzes
- F. a. written individual assignments and/or journal- to demonstrate individual student progress toward objectives b. small group presentations- to demonstrate student participation in problem solving process c. written exams/quizzes - to reflect student knowledge of vocabulary, concepts, and application of concepts to problem solving as presented in lectures and discussion, small group sessions, and text readings. d. Final Examination - to reflect student knowledge of vocabulary, concepts, and applications of concepts to problem solving as presented in lectures and discussions, small group sessions, and text readings. e. participation - to reflect student involvement in class discussions, small group sessions and presentations, etc.

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Lehman, Jay. *Intermediate Algebra*, 4rd ed. Prentice-Hall, 2010

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Course Originator: Cheryl Gregory