

College of San Mateo Course Outline

- New Course
 Update/No change
 Course Revision (Minor)
 Course Revision (Major)

Date: 9 February 2011

Department: **Mathematics** Number: **MATH 120**

Course Title: Intermediate Algebra Units: **5**

Total Semester Hours Lecture: **80** Lab: **0** Homework: **144** By Arrangement: **16**

Length of Course

- Semester-long
 Short course (Number of weeks ___)
 Open entry/Open exit

Grading

- Letter
 Pass/No Pass
 Grade Option (letter or Pass/No Pass)

Faculty Load Credit (To be completed by Division Office; show calculations.): 80/16 = 5 FLCs

1. Prerequisite (Attach Enrollment Limitation Validation Form.)
MATH 110 or MATH 112 or appropriate score on the College Placement Test and other measures as appropriate.
2. Corequisite (Attach Enrollment Limitation Validation Form.)
None
3. Recommended Preparation (Attach Enrollment Validation Form.)
Eligibility for READ 400 or an equivalent level of reading proficiency.
4. Catalog Description (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)
Minimum of 80 lecture hours plus 16 hours by arrangement. Prerequisite: MATH 110 or MATH 112 or appropriate score on the College Placement Test and other measures as appropriate. Recommended preparation: Eligibility for READ 400 or an equivalent level of reading proficiency. 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, exponential and logarithmic functions, sequences and series.(AA, Area C1/Area E2c)
5. Class Schedule Description (Include prerequisites/corequisites/recommended preparation. For format, please see model course outline.)
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, exponential and logarithmic functions, sequences and series. Plus 16

hours by arrangement- Extra supplies may be required. *Prerequisite:* MATH 110 or MATH 112 or appropriate score on the College Placement Test and other measures as appropriate. *Recommended preparation:* Eligibility for READ 400 or an equivalent level of reading proficiency. (AA, Area C1/Area E2c)

6. Student Learning Outcomes (Identify 1-6 expected learner outcomes using active verbs.)

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

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.

7. Course Objectives (Identify specific teaching objectives detailing course content and activities. For some courses, the course objectives will be the same as the student learning outcomes. In this case, "Same as Student Learning Outcomes" is appropriate here.)

Course Objectives are the same as the Student Learning Outcomes.

8. Course Content (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, a sample course syllabus with timeline may be attached.)

1. Algebra and Problem Solving.
 - a. Operations and Properties of Real Numbers.
 - b. Solving Equations and Simplifying Expressions.
 - c. Introduction to Problem Solving.
 - d. Properties of Exponents; Scientific Notation.
2. Graphs, Functions, and Linear Equations.
 - a. Linear Functions: Graphs and Models.
 - b. Inverse Functions
3. Systems of Linear Equations
 - a. Solving by Substitution or Elimination.
 - b. Solving Applications: Systems of Two Equations.
 - c. Systems of Equations in Three Variables.
 - d. Solving Applications: Systems of Three Equations.
4. Inequalities
 - a. Simple Inequalities
 - b. Intersections, Unions, and Compound Inequalities.

- c. Absolute-Value Equations and Inequalities.
 - d. Inequalities in Two Variables.
 - e. Applications
5. Polynomials and Polynomial Functions.
 - a. Polynomial Operations.
 - b. Common Factors and Factoring by Grouping.
 - c. Factoring Trinomials.
 - d. Perfect-Square Trinomials, Differences of Squares, Sums or Differences of Cubes
 - e. Applications.
 6. Rational Expressions, Equations, and Functions.
 - a. Rational Expressions: Multiplying and Dividing, Adding and Subtracting.
 - b. Complex Rational Expressions.
 - c. Rational Equations.
 - d. Solving Applications Using Rational Equations.
 - e. Rational Functions.
 - f. Division of Polynomials
 - g. Formulas, Applications, and Variation.
 7. Exponents and Radicals.
 - a. Radical Expressions and Functions.
 - b. Rational Numbers as Exponents.
 - c. Adding, Subtracting, Multiplying, Dividing, and Simplifying Radical Expressions.
 - d. Radical Equations.
 - e. Applications.
 - f. The Complex Numbers.
 8. Quadratic Functions and Equations.
 - a. Solving by Quadratic Formula, Factoring, and Completing the Square.
 - b. Applications Involving Quadratic Equations.
 - c. Quadratic Functions and Their Graphs.
 9. Exponential and Logarithmic Functions.
 - a. Exponential Functions.
 - b. Composite and Inverse Functions.
 - c. Logarithmic Functions.
 - d. Properties of Logarithmic Functions.
 - e. Common and Natural Logarithms.
 - f. Solving Exponential and Logarithmic Equations.
 - g. Applications of Exponential and Logarithmic Functions.
 10. Sequences, Series, and the Binomial Theorem.
 - a. Sequences and Series.
 - b. Arithmetic Sequences and Series.
 - c. Geometric Sequences and Series.
9. Representative Instructional Methods (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Describe out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills. If hours by arrangement are required, please indicate the additional instructional activity which will be provided during these hours, where the activity will take place, and how the activity will be supervised.)
- A. Instructor carefully chooses or creates relevant out-of-class exercises to be completed either on-line or in written form.
 - B. Instructor creates or uses already created in-class assignments for students to do with the help of other students and the instructor.

- C. Instructor may create longer written assignments for students to complete in essay form; these assignments are meant to incorporate mathematical modeling or exposition of applications of mathematics.
 - D. To encourage critical thinking:
 - 1. Lecture/discussion and demonstrations to model the problem-solving process.
 - 2. Small group problem solving where proposed solutions are evaluated in light of constraints to the problem.
 - E. Instructor directs students to resources available on CD and the Internet may be used to supplement the text.
 - F. Hours by arrangement are completed by working on assignments in the Math Resource Center under the supervision of mathematics instructors working there.
10. Representative Methods of Evaluation (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)
- A. Completed individual assignments and/or journal either in paper form or written on-line: to demonstrate individual student progress toward objectives.
 - B. Small group presentations: to reflect student participation in problem solving process.
 - C. Written exams/quizzes: to demonstrate 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. A Final Examination: to demonstrate student knowledge of vocabulary, concepts, and applications of concepts to problem solving as presented in lectures and discussions, small group sessions, and text readings for the entire course.
 - E. Participation: to reflect student involvement in class discussions, in small group sessions and in presentations.
11. Representative Text Materials (With few exceptions, texts need to be current. Include publication dates.)

Texts: Lehmann, Jay, *Intermediate Algebra: Functions and Authentic Applications*, 4th Ed. 2011, Upper Saddle River, NJ: Pearson Prentice Hall. ISBN: 9780131953338.

Bittinger, M. L. and D. J. Ellenbogen, *Intermediate Algebra: Concepts and Applications*, 8th Ed. 2009, Reading, MA: Addison Wesley. ISBN: 9780321557186.

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