1. **COURSE ID:** MATH 120   **TITLE:** Intermediate Algebra
   Units: 5.0 units **Hours/Semester:** 80.0-90.0 Lecture hours; and 160.0-180.0 Homework hours
   Method of Grading: Letter Grade Only
   Prerequisite: MATH 110 or placement by other college approved methods.

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: E2b. Communication and Analytical Thinking

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   > 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.

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 inequal ities, 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 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 .

6. COURSE CONTENT:
Lecture Content:

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.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**
   Typical methods of instruction may include:
   A. Lecture
   B. Other (Specify): Instructor carefully chooses or creates relevant out-of-class exercises to be completed either on-line or in written form. Instructor creates or uses already created in-class assignments for students to do with the help of other students and the instructor. 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. 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. Instructor directs students to resources available on CD and the Internet may be used to supplement the text.

8. **REPRESENTATIVE ASSIGNMENTS**
   Representative assignments in this course may include, but are not limited to the following:
   Writing Assignments:
   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.
   Reading Assignments:
   Instructor directs students to resources available on CD and the Internet may be used to supplement the text.
   Other Outside Assignments:
   Instructor carefully chooses or creates relevant out-of-class exercises to be completed either on-line or in written form.

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. Written examination
   G. Completed individual assignments and/or journal either in paper form or written on-line: to demonstrate individual student progress toward objectives. Small group presentations: to reflect student participation in problem solving process. 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. 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. Participation: to reflect student involvement in class discussions, in small group sessions and in presentations.

10. **REPRESENTATIVE TEXT(S):**
    Possible textbooks include:
    A. Lehmann, J.. *Intermediate Algebra: Functions and Authentic Applications*, ed. Pearson Prentice Hall, 2019
    B. Bittinger, M. L. and Ellenbogen, D. J.. *Intermediate Algebra: Concepts and Applications*, ed. Pearson, 2019