

MATH A045: COMBINED ELEMENTARY AND INTERMEDIATE ALGEBRA

Item	Value
Curriculum Committee Approval Date	12/04/2024
Top Code	170100 - Mathematics, General
Units	6 Total Units
Hours	108 Total Hours (Lecture Hours 108)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

This course includes all the topics that are studied in elementary algebra and intermediate algebra. Thus starting at the elementary level, each topic is covered up to the level of intermediate algebra. Topics include, introduction and advance operations with algebraic expressions, linear graphing and factoring. Functions, linear and quadratic equations, curve sketching, exponents, rational expressions, rational exponents, logarithms, variations, systems of equations, and conic sections. A minimum of five arranged hours of supplemental learning per semester in the Success Center is suggested. Enrollment Limitation: MATH A030; students who complete MATH A045 may not enroll in or receive credit for MATH A030. PREREQUISITE: MATH A008 or appropriate placement. Not Transferable.

Course Level Student Learning Outcome(s)

1. Upon completion of the course, the student will be able to solve mathematical application problems by applying critical thinking skills and express the solution in oral or written form.
2. Upon completion of the course, the student will be able to perform operations on real numbers and algebraic expressions.
3. Upon completion of the course, the student will be able graph linear equations and inequalities.
4. Upon completion of the course, the student will be able to solve linear and nonlinear equations and inequalities by performing mathematical operations on complex numbers, algebraic, exponential and logarithmic expressions.
5. Upon completion of the course, the student will be able to solve system of linear equations and inequalities.
6. Upon completion of the course, the student will be able to evaluate and analyze characteristics of different types of functions.

Course Objectives

- 1. Simplify expressions involving exponents and polynomials.
- 2. Factor polynomials.

- 3. Solve and graph linear equations and inequalities in one variable.
- 4. Solve and graph linear equations and inequalities in two variables
- 5. Solve systems of equations with two variables using graphing, addition and substitution and Cramer's Rule.
- 6. Solve systems of equations in three variables
- 7. Simplify rational expressions and solve rational equations.
- 8. Simplify radicals and solve radical equations involving square root.
- 9. Understand and use the real and complex number systems.
- 10. Simplify expressions involving rational exponents and roots.
- 11. Demonstrate a working knowledge of relations and functions.
- 12. Understand completing the square and use it to solve quadratic equations.
- 13. Use the quadratic formula.
- 14. Solve and graph quadratic equations and inequalities.
- 15. Graphs conics.
- 16. Interpret, analyze, and write equations for narrative exercises.
- 17. Solve narrative exercises.
- 18. Demonstrate a working knowledge of mathematical terminology.

Lecture Content

It is imperative that instructors cover all listed below to prepare students for all classes including: Math A100, Math A104, Math A120, Math A130, Math A154 or Math A160. The instructor shall determine the order and sequence of topics to be covered in terms of adhering to the Official Course Outline of Record. 1. Review of Arithmetic and geometric concepts. 2. Review of real numbers and variables. Signed numbers, exponents, distributive, commutative, and associate properties. Distinguish between terms and factors and review algebraic terminology. 3. Solve linear equations and inequalities in one variable. Solve linear equations with integer or fraction coefficients and graph their solutions. Solve literal equations and formulas. Solve inequalities with integer or fraction coefficients and graph their solutions. Solve absolute value equations. 4. Solve introductory level word problems involving equations in one variable. Translate English sentences into algebraic equations Use equations to solve applied problems 5. Rules of exponents and operations of polynomials. Discuss and use the algebraic rules for products, quotients and powers with integer exponents. Add, subtract, multiply and divide polynomials. 6. Graphs relations and functions. Introduction to the rectangular coordinate system Find the slope and distance between two points Use the relationship between the slopes of parallel and perpendicular lines Sketch linear equations Find the equation of a line Introduce relations and functions Evaluate composite functions 7. Solve systems of linear equations and inequalities. Equations involving two or three variables using substitution and elimination Evaluate determinants and use Cramer's Rule for two or three variables Selected applied exercises using two or three variables Systems of inequalities in two variables by graphing 8. Polynomials and factoring Prime Factorization. Factor: common factors and GCF, quadratic form, sum and difference of cubes, grouping and special cases including perfect square trinomials and difference of squares. Optional: Manipulate monomials with variables as exponents. Solve quadratic equations and equations in quadratic form using factoring. Solve selected applied exercises involving factorable quadratic equations. 9. Rational expressions Simplify, add, subtract, multiply and divide algebraic fractions including complex fractions. Solve equations involving rational expressions including literal equations. Solve selected applied exercises involving fractional equations. Divide polynomials.

10. Radicals and rational exponents Define and perform operations on radical expressions and rational exponents. Solve equations involving radicals. Solve selected applied exercises. Introduce complex numbers

11. Solve quadratic equations and inequalities Solve equations by factoring completing the square quadratic formula. Selected applied exercises involving quadratic equations. Optional: Quadratic inequalities fractional inequalities

12. Quadratic functions Operations with functions and introduce inverse functions. Graph parabolic functions including finding the vertices. Solve selected applied variation and maximum and minimum exercises.

13. Exponential and logarithmic functions Convert between exponential and logarithmic forms. Sketch exponential and logarithmic functions. Find common and natural logarithms and apply properties of logarithms. Solve exponential and logarithmic equations. Solve selected applications exercises

13. Conic sections Identify and graph circles ellipses and hyperbolas centered at the origin. Solve nonlinear systems of equations. Graph nonlinear inequalities

15. Sequences and Series (Optional Topics) Arithmetic Sequences and Series. Geometric Sequences and Series. Binomial Theorem

Method(s) of Instruction

- Lecture (02)

Instructional Techniques

The primary mode of instruction is the lecture/demonstration method. Some sections are laboratory based using a variety of instructional methods including textbooks, video presentations and computer based materials. Some sections may be taught using cooperative learning strategies. College learning assistance programs support instructions through the use of the following methodologies: Workshops designed by faculty Study groups designed by faculty Directed/diagnostic learning activities designed by faculty Pass (Peer Assisted Study Session) Program Individual and group tutoring. These methodologies can be determine by the instructor or recommended by instructional associate to support any course objective.

Reading Assignments

Student will be assigned at least one hours reading assignment per week worth of material from the textbook.

Writing Assignments

Student will be assigned at least one hour of writing assignments. Writing is encouraged throughout the course, but it is not necessarily a part of the grading.

Out-of-class Assignments

Student will be assigned at least ten hours per week worth of problem solving assignments that involve problems to master the mathematical concepts and also application problems.

Demonstration of Critical Thinking

Student will be assigned at least ten hours per week worth of problem solving assignments that involve problems to master the mathematical concepts and also application problems. Grades are determined by performance on quizzes and exams. Some instructors may also include grades on homework, cooperative learning sessions. A comprehensive final is part of this course.

Required Writing, Problem Solving, Skills Demonstration

Student will be assigned at least one hour of writing assignments. Writing is encouraged throughout the course, but it is not necessarily a part of the grading.

Eligible Disciplines

Mathematics: Master's degree in mathematics or applied mathematics OR bachelor's degree in either of the above AND master's degree in statistics, physics, or mathematics education OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Tobey, J., Slater, J., Blair, J., Crawford. Beginning Intermediate Algebra, 4 ed. Pearson, 2013

2. Required Aufmann, R. N., Lockwood, J. S.. Algebra: Beginning Intermediate, 3rd ed. Cengage, 2013

3. Required Martin-Gay, E. E.. Beginning Intermediate Algebra, 5th ed. Pearson, 2016

4. Required Marvin Bittinger, David Ellenbogen, Barbara Johnson. Introductory and Intermediate Algebra, ed. Pearson, 2016

Other Resources

1. One of the textbook listed in COR or any other appropriate Textbook and/or material as selected by the full-time faculty

2. Scientific calculator may be recommended