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| **Course Acronym:** | AHSD |
| **Course Number:** | 513 |
| **Descriptive Title:** | High School Algebra 1B |
| **Division:** | Adult High School Diploma |
| **Department:** | Adult High School Diploma |
| **Course Disciplines:** | Adult High School Diploma |
| **Catalog Description:** | This course is a study of the language, concepts, and techniques of algebra, including exponents, systems of equations, quadratic and exponential functions, rational and irrational numbers, and polynomials. The course lays a foundation for upper level math and science courses. Successful completion of this course contributes to progress toward a high school diploma or equivalent. From 1-10 high school credits can be earned in 15-hour modules.<br><br>Note: This course is open entry/open exit. |
| **Prerequisite:** | AHSD 512 or placement based on the math assessment process |
| **Co-requisite:** | |
| **Recommended Preparation:** | |
| **Enrollment Limitation:** | |
| **Hours Lecture (per week):** | .83 to 8.33 |
| **Hours Laboratory (per week):** | 0 |
| **Outside Study Hours:** | 1.66 to 16.66 |
| **Total Course Hours:** | 15 to 150 |
| **Course Units:** | 0 |
| **Grading Method:** | Pass/No Pass/SP |
| **Credit Status:** | Noncredit |
| **Transfer CSU:** | No |
| **Effective Date:** | |
| **Transfer UC:** | No |
| **Effective Date:** | |
| **General Education: ECC** | |
| **Term:** | |
| **Other:** | |
| **CSU GE:** | |
| **Term:** | |
| **Other:** | |
| **IGETC:** | |

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| **Term:** | |
| **Other:** | |
| **Cal-GETC:** | |
| **Term:** | |
| **Other:** | |
| **Student Learning Outcomes:** | Upon completion of the course, students will be able to:<br>1. analyze fractional and negative exponents to probe exponential growth and decay.<br><br>2. compare functions and relations.<br><br>3. solve systems of linear equations and word problems that require systems of equations. |
| **Course Objectives:** | 1. Calculate fractional powers of integers and rational numbers.<br><br>2. Compute fractions powers of algebraic terms.<br><br>3. Express negative powers of constants and algebraic terms as reciprocals of positive powers of constants and algebraic terms.<br><br>4. Solve exponential growth and decay word problems.<br><br>5. Define functions with tables and graphs.<br><br>6. Solve function equations incorporating direct and inverse variation.<br><br>7. Compare three methods of solving simultaneous equations (graphic, substitution, and elimination) and determine which method is more appropriate in different situations.<br><br>8. Solve digit, age, work, coin, mixture, wind and water current word problems using systems of linear equations.<br><br>9. Demonstrate irrational numbers using the Pythagorean Theorem.<br><br>10. Conduct arithmetic operations with radical expressions and binomials containing radicals.<br><br>11. Factor quadratic expressions.<br><br>12. Compare several methods of solving quadratic equations and determine which is most appropriate in specific situations.<br><br>13. Solve word problems with quadratic equations.<br><br>14. Classify polynomials by degree.<br><br>15. Add, subtract, and multiply polynomials.<br><br>16. Divide polynomials using long division and synthetic division. |
| **Major Topics:** | **I. Rate, ratio, proportion, percents (lecture)**<br><br>A. Review of fractions |

B. Solve equations and word problems using fractions, rate, ratio, and proportion

C. Percents and percent problems

D. Work, coin, and mixture problems

E. Negative exponents and scientific notation; fractional exponents and high order roots

**II. Functions (lecture)**

A. Equations in two variables

B. Points, lines, and Cartesian coordinate graphs

C. Slope of a line; equations of a line - slope/intercept, standard, point/slope

D. Tables and graphs to define equations

E. Linear and quadratic functions

F. Direct and indirect variation

**III. Systems of linear equations (lecture)**

A. Graphic, substitution, and elimination methods of solution

B. Wind and water current problems

C. Digit, age, work, coin, mixture and other fraction problems

**IV. Rational and irrational numbers (lecture)**

A. Properties of rational numbers

B. Decimal forms of rational numbers

C. Rational roots and irrational roots; square roots of variable expressions

D. Pythagorean Theorem

E. Arithmetic operations with, and simplification of, radical expressions and binomials containing radicals; solve simple radial equations

**V. Quadratic functions (lecture)**

A. Factor quadratic expressions

1. Factor out common factors from quadratic expressions

2. Factor by grouping and splitting the middle

3. Factor perfect squares, difference of two squares, squares of binomials

4. Factor quadratic expressions with integer coefficients

B. Solve simple quadratic equations

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| | 1. Taking the square root of each side of the equation<br><br>2. Using patterns of perfect squares, difference of two squares, factoring and using the zero product<br><br>property<br><br>3. Using general factoring methods<br><br>C. Solve equations by other methods to determine rational or irrational root solutions.<br><br>1. Completing the square<br><br>2. Quadratic formula<br><br>3. Graphing<br><br>D. Solve systems of quadratic equations<br><br>E. Solve word problems using quadratic equations and determine whether roots are extraneous<br>**VI. Polynomials (lecture)**<br><br>A. Classification of polynomials<br><br>B. Addition, subtraction, and multiplication of polynomials<br><br>C. Division of polynomials<br><br>1. Long division and synthetic division<br>**VII. Exponential functions (lecture)**<br><br>A. Examine fractional, negative, and 0 exponents<br><br>B. Graph exponential growth and decay<br><br>C. Examine exponential functions |
| **Total Lecture Hours:** | 15 to 150 |
| **Total Laboratory Hours:** | 0 |
| **Total Hours:** | 15 to 150 |
| **A.1. Primary Methods of Evaluation (Part 1 - CCN courses only):** | |
| **A.2. Primary Method of Evaluation (Part 2 - all courses; choose one):** | 2) Problem solving demonstrations (computational or non-computational) |

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| **Typical Assignment Using Primary Method of Evaluation:** | With a partner, try to factor a^3+b^3 and also a^3-b^3. Keep a record of your experiment and jot down notes about why you tried each particular approach and whether or not it got you closer to a solution. Are these two expressions factorable? |
| **Critical Thinking Assignment 1:** | On three pieces of 8.5x11 graph paper, draw axes and fill in scale. Then graph the following sets of equations, one set per graph:<br>a) y=x^2, y=x^2+3, y=x^2+7, y=x^2-3, y=x^2-7<br><br>b) y=x^2, y=2x^2, y=5x^2, y=0.5x^2, y=0.2x^2<br><br>c) y=x^2, y=-x^2, y=-2x^2, y=-2x^2+3<br>On a separate paper, write descriptions of the changes that you saw in the graphs and what aspect of the equations appear to correlate with those changes. On an additional piece of graph paper, write five equations and then graph them, using what you learned from this exercise. |
| **Critical Thinking Assignment 2:** | On three pieces of 8.5x11 graph paper, draw axes and fill in scale. Then graph the following sets of equations, one set per graph. [Sets of equations will be provided, incorporating exponents 3, 4, 5, 6, 10, and 20 with positive and negative coefficients of the leading term, and some including additional variable terms, to illustrate width of curves and number of turning points.]<br>On a separate paper, write a description of what changes you saw in the graphs of the three sets of equations and what aspects of the equations appeared to relate to those changes. Explain the differences that occur which are related to the magnitude of the exponent. |
| **Other Evaluation Methods:** | Homework Problems, Objective Exam, Quizzes, Written Homework |
| **Instructional Methods:** | Demonstration, Discussion, Group Activities, Lecture, Multimedia presentations |
| **If other:** | |
| **Work Outside of Class:** | Answer questions, Problem solving activity, Required reading, Skill practice, Study |
| **If Other:** | |
| **Up-To-Date Representative Texts:** | Martin-Gay, Elayne. *Beginning Algebra*, 8th Edition. Pearson, 2023 |
| **Alternative Texts:** | |
| **Required Supplementary Readings:** | |
| **Other Required Materials:** | |
| **Requisite:** | Prerequisite |
| **Category:** | sequential |
| **Requisite course(s): List both prerequisites and corequisites in this box.** | AHSD 512 |
| **Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).** | |

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| **Requisite Skill:** | |
| **Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable** | |
| **Requisite course:** | |
| **Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).** | **Simplify multi-term expressions with roots and powers by correctly combining like terms.**<br>AHSD 512 - Simplify multi-term expressions with roots and powers by correctly combining like terms.<br>**Demonstrate properties of algebraic and numeric operations - commutative, associative, distributive, identity, transitive, zero product.**<br>AHSD 512 - Demonstrate properties of algebraic and numeric operations - commutative, associative, distributive, identity, transitive, zero product.<br>**Solve multi-step equations in one variable.**<br>AHSD 512 - Solve multi-step equations in one variable.<br>**Define variables, identify question asked, write equations to encapsulate information given in word problem.**<br>AHSD 512 - Define variables, identify question asked, write equations to encapsulate information given in word problem.<br>**Add and subtract monomials, binomials and polynomials.**<br>AHSD 512 - Add and subtract monomials, binomials and polynomials.<br>**Multiply binomials and trinomials.**<br>AHSD 512 - Multiply binomials and trinomials.<br>**Categorize relations and function expressed as graphs or tables or equations.**<br>AHSD 512 - Categorize relations and function expressed as graphs or tables or equations. |
| **Requisite Skill:** | |
| **Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable** | |
| **Enrollment Limitations and Category:** | |
| **Enrollment Limitations Impact:** | |
| **Course Created by:** | Matthew Kline |
| **Date:** | 03/07/2024 |
| **Original Board Approval Date:** | 01/13/2025 |
| **Last Reviewed and/or Revised by:** | Matt Kline |
| **Date:** | 03/11/2026 |
| **Last Board Approval Date:** | 05/20/2026 |
| **Effective Term:** | FA 2026 |