

**MT. DIABLO UNIFIED SCHOOL DISTRICT  
COURSE OF STUDY  
DRAFT**

<b>COURSE TITLE:</b>	<b>Algebra II</b>
<b>COURSE NUMBER:</b>	<b>1330</b>
<b>CALPADS NUMBER:</b>	<b>2404</b>
<b>CST:</b>	<b>Algebra II</b>
<b>DEPARTMENT:</b>	<b>High School Mathematics</b>
<b>NCLB CREDENTIAL REQUIREMENT:</b>	<b>Math Credential with Subject Matter Proficiency</b>
<b>LENGTH OF COURSE:</b>	<b>One Year</b>
<b>CREDITS PER SEMESTER:</b>	<b>5</b>
<b>GRADE LEVEL(S):</b>	<b>10-12</b>
<b>REQUIRED OR ELECTIVE:</b>	<b>This course fulfills one year of the high school mathematics requirement and UC/CSU “c” requirement.</b>
<b>PREREQUISITES:</b>	<b>Successful completion of Geometry</b>

**BOARD OF EDUCATION ADOPTION:**

**COURSE DESCRIPTION:**

This course provides the student with the knowledge, concepts and skills identified in the California State Math Standards for Algebra II. The ability to communicate mathematical reasoning and understanding will be incorporated into all math topics. In addition, students will develop their ability to construct formal, logical arguments in algebraic settings and problems. This course is the third course in the three-year mathematics requirement for four-year college admission.

**COURSE OUTLINE:**

**1. MAJOR GOALS**

- 1.1 To develop the ability to reason logically and think symbolically
- 1.2 To develop skills for communicating mathematically
- 1.3 To build algebraic models, formulate and solve problems
- 1.4 To improve the skills necessary to be successful in multiple careers

**2. PERFORMANCE OBJECTIVES:**

(numbers in parentheses refers to an appropriate California State Standard)

- 2.1 Algebra II
  - 2.1.1 Solve equations and inequalities involving absolute value. (1.0)
  - 2.1.2 Solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices. (2.0)

- 2.1.3 Operations on polynomials, including long division. (3.0)
- 2.1.4 Factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes. (4.0)
- 2.1.5 Demonstrate knowledge of how real and complex numbers are related both arithmetically and graphically. In particular, they can plot complex numbers as points in the plane. (5.0)
- 2.1.6 Add, subtract, multiply, and divide complex numbers. (6.0)
- 2.1.7 Add, subtract, multiply, divide, reduce, and evaluate rational expressions with monomial and polynomial denominators and simplify complicated rational expressions, including those with negative exponents in the denominator. (7.0)
- 2.1.8 Solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Application of these techniques in solving word problems. Solving quadratic equations in the complex number system. (8.0)
- 2.1.9 Demonstrate and explain the effect that changing a coefficient has on the graph of quadratic functions; that is determination of how the graph of a parabola changes as  $a$ ,  $b$ , and  $c$  vary in the equation  $y = a(x-b)^2$ . (9.0)
- 2.1.10 Graphing quadratics functions and determines the maxima, minima, and zeros of the function. (10.0)
- 2.1.11 Prove simple laws of logarithms. (11.0)
- 2.1.12 Understanding of the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. (11.1)
- 2.1.13 Judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step. (11.2)
- 2.1.14 Knowledge of the laws of fractional exponents, exponential functions, and the use of these functions in problems involving exponential growth and decay. (12.0)
- 2.1.15 Use the definition of logarithms to translate between logarithms in any base. (13.0)
- 2.1.16 Understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values. (14.0)
- 2.1.17 Determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true. (15.0)
- 2.1.18 Demonstration and explanation of how the geometry of the graph of a conic section (e.g., asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it. (16.0)
- 2.1.19 Given a quadratic equation of the form  $ax^2 + by^2 + cx + dy + e = 0$ , demonstration of knowledge of the method of completing the square in order to put the equation into standard form and

- recognition of whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Graphing of the equation. (17.0)
- 2.1.20 Demonstration of fundamental counting principles to compute combinations and permutations. (18.0)
- 2.1.21 Demonstration of computing probabilities by using combinations and permutations. (19.0)
- 2.1.22 Knowledge of the binomial theorem and usage of it to expand binomial expression that is raised to positive integer powers. (20.0)
- 2.1.23 Application of the method of mathematical induction to probe general statements about the positive integers. (21.0)
- 2.1.24 Finding the general term and the sums of arithmetic series and of both finite and infinite geometric series. (22.0)
- 2.1.25 Derivation of the summation formulas for arithmetic series and for both finite and infinite geometric series. (23.0)
- 2.1.26 Solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions. (24.0)
- 2.1.27 Use of properties from number systems to justify steps in combining and simplifying functions. (25.0)

### 3. **CONTENT OUTLINE:**

(numbers in parentheses refer to appropriate performance objectives)

#### 3.1 Algebra II

- 3.1.1 Equations or inequalities and systems of equations or inequalities including career applications (2.1.1, 2.1.2)
- 3.1.2 Polynomials, complex numbers, and rational expressions (2.1.3-2.1.8, 2.1.17)
- 3.1.3 Quadratic formula, completing the square and quadratic functions (2.1.8-2.1.10, 2.1.18, 2.1.19)
- 3.1.4 Logarithms with career applications (2.1.11-2.1.13, 2.1.15-2.1.16, 2.1.17)
- 3.1.5 Fractional exponents (2.1.14)
- 3.1.6 Conic Sections (2.1.16)
- 3.1.7 Combinations and permutations (2.1.20-2.1.21)
- 3.1.8 Binomial theorem (2.1.22)
- 3.1.9 Mathematical induction (2.1.23)
- 3.1.10 Algebraic and geometric series (2.1.24-2.1.25)
- 3.1.11 Functions (2.1.26-2.1.27)

### 4. **TIME ESTIMATES:**

- 4.1 Instructional sequences vary in length from a few days to several weeks.

### 5. **INSTRUCTIONAL MATERIALS:**

- 5.1 District adopted textbooks
- 5.2 Supplementary and teacher-created materials that include a career focus

5.3 Technology materials

6. **EVALUATION OF STUDENT PROGRESS:**

Student communicates mathematically and demonstrates content knowledge in a variety of ways that lead to mathematical competence in their chosen careers.

- 6.1 Teacher observation
- 6.2 Written assignments and projects
- 6.3 Quizzes and tests
- 6.4 Rubrics

**Committee Members:**

Frank Bruketta	CVHS
Danielle Dell	CVHS
Susan Seeley	CVHS
Bodhi Young	CVHS
Suzette Blanke	CPHS
Robert Lovelace	CPHS
Angel Niedzielski	CPHS
Norma Meyerkorth	CHS
Brianne Whiteside	CHS
Kathleen Magana	MDHS
Steve Sankey	MDHS
Judith Cubillo	NHS
Ellen Dill	NHS
Rianne Pfaltzgraff	NHS
Leslie Addiego	YVHS
Mary Ditkof	YVHS
Kelly Donlon	YVHS
John Ghiozzi	YVHS
Sharon Simone	RMS
Sandy Bruketta	Curriculum Specialist (Curriculum & Instruction)