**Precalculus MAT 440 AC**

**Resource(s) used:**

**Primary: Precalculus with Larson and Hostetler**

This course is designed for the accelerated student and includes such topics as linear functions, theory of polynomials, sequences and series, matrices, analytical geometry, relations and functions, limits, differentiation and integration. Students will learn to solve problems through the use of graphing calculators and be required to graph functions and solve problems without the use of technological devices. Students may sign up for 4 hours of college credit through NCCC.

**Final Assessment:**  These students will be required to take a NFCSD final exam.

**Course Syllabus**

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| **Lesson** | **Topic(s)** |
| **1** | The Cartesian Plane   * Distance Formula * Midpoint Formula * Equation of a Circle |
| **2** | Graphs and STAT PLOTS |
| **3** | Lines in the Plane   * Slope, Point Slope * Slope-Intercept * Parallel and Perpendicular Lines |
| **4** | Solving Equations   * Algebraically and Graphically * Linear Equations * Rational Equations |
| **5** | *x* and *y* Intercepts   * Points of Intersection * Quadratic Equations |
| **6** | Polynomial Equations   * Radical Equations * Absolute Value Equations * Literal Equations |
| **7** | Properties of Inequalities   * Interval Notation * Solving Inequalities * Absolute Value Inequalities * Polynomial Inequalities |
| **8** | Functions   * Definition * Notation * Evaluating * Piecewise * Domain * Difference Quotient |
| **9** | Graphs of Functions   * Domain and Range from a Graph * Increasing * Decreasing * Constant * Relative Minimum * Relative Maximum * Step Functions * Even and Odd Functions |
| **10** | Step Functions   * Vertical and Horizontal Shifts * Reflections |
| **11** | Non-Rigid Transformations   * Combinations of Functions |
| **12** | Inverse Functions |
| **13** | Quadratic Functions   * Vertex Form |
| **14** | Polynomial Functions   * Leading Coefficient Test * Zeros (roots or *x*-intercepts) * Sketching Graphs * Intermediate Value Theorem |
| **15** | Long Division of Polynomials   * *P(x) = d(x) q(x) + r(x)* * Exponential Functions * *e* = |
| **16** | Synthetic Division   * Compound Interest |
| **17** | Remainder and Factor Theorem   * Exponential Growth |
| **18** | Rational Roots Theorem   * Upper and Lower Bound Rule * Descartes’ Rule of Signs |
| **19** | Complex Numbers   * Logarithmic Functions |
| **20** | Fundamental Theorem of Algebra   * Properties of Logarithms |
| **21** | Rational Functions and Asymptotes |
| **22** | Graphs of Rational Functions |
| **23** | Solving Exponential and Logarithmic Equations |
| **24** | Exponential Models |
| **25** | Radian Measure   * Arc Length * Speed * Angular Speed |
| **26** | Trigonometric Functions   * The Unit Circle |
| **27** | Right Triangle Trigonometry   * Sequences |
| **28** | Trigonometric Identities   * Summation Notation |
| **29** | Trigonometric Functions of Any Angle   * Reference Angles * Arithmetic Sequences |
| **30** | Graphing   * *y = d + a sin(bx –c)* * *y = d + a cos(bx – c)* |
| **31** | The Sum of an Arithmetic Sequence |
| **32** | Graphing *y = a tan (bx – c)* |
| **33** | Geometric Sequences |
| **34** | Graphing *y = a cot (bx – c)*   * Mathematical Induction |
| **35** | Graphing *y = a csc (bx – c)*   * Binomial Theorem |
| **36** | *(x-h)2 = 4p(y – k)* |
| **37** | Parabolas with a Horizontal Axis |
| **38** | Ellipses |
| **39** | Inverse Trigonometry |
| **40** | Applications of Right Triangle Trigonometry |
| **41** | Using Fundamental Identities |
| **42** | Introduction to Limits |
| **43** | Techniques for Evaluating Limits   * System of Equations * Matrices |
| **44** | Verifying Trigonometric Identities |
| **45** | Parametric Equations |
| **46** | The Tangent Line Problem |
| **47** | Solving Trigonometric Equations |
| **48** | Partial Fraction Decomposition   * Polar Coordinates |
| **49** | Partial Fractions: Decomposition with Repeated Linear Factors |
| **50** | Limits at Infinity   * Limits of Sequences |
| **51** | Polar Graphs |
| **52** | Summation Formulas |
| **53** | The Area Problem |
| **54** | Average and Instantaneous Velocity |
| **55** | Position and Distance |
| **56** | Hyperbolas |