Precalculus Algebra: University of Alabama

(For a list of materials used in the course, please see
http://www.theNCAT.org/R2R/AcadPrac/CM/UA_PreCalc_Mat.pdf.)

Precalculus Algebra is a one-semester, three-credit course that covers the following topics:

Algebraic Expressions
    Real Numbers and Their Properties
    Order and Absolute Value
    Polynomials; The Binomial Theorem
    Factoring polynomials
    Rational Expressions
    Rational Exponents
    Radical Expressions
    Internet Project: The NFL Quarterback Rating System

Linear Equations
    Linear applications and Modeling
    Complex Number
    Quadratic Equations
    Quadratic Applications and Modeling
    Other Types of Equations
    Inequalities
    Absolute Value Equations and Inequalities
    Internet Project: Protecting Our Environment

Relations, Functions, and Graphs
    Relations and the Rectangular Coordinate System; Circles
    Functions
    Linear Functions
    Equations of Lines; Curve Fitting
    Graphs of Relations and Functions
    General Graphing Techniques
    Operations and composition
    Internet project: Modeling the Drift of Whittier, California

Polynomials and Rational Functions
    Quadratic Functions; Curve Fitting
    Synthetic Division
    Zeros of polynomial Functions
    Polynomial Functions: Graphs, Applications, and Models
    Rational Functions: Graphs, Applications, and Models
    Variation
    Internet Project: Polynomial Modeling of Social Security Numbers

Exponential and Logarithmic Functions
    Inverse Functions
    Exponential Functions
    Logarithmic Functions
    Evaluating Logarithms and the Change of Base Theorem
    Exponential and Logarithmic Equations
    Applications and Models of Exponential Growth and Decay
    Internet Project: Modeling Growth of Internet Hosts

Trigonometric Functions
    Angles
    Right Triangles and Trigonometric Functions
    Finding Trigonometric Function Values
    Solving Right Triangles
    Radian Measure
    The Unit Circle and Circular Functions
    Graphs of the Sine and Cosine Functions
    Harmonic Motion
    Graphs of the Other Circular Functions
    Internet Project: Modeling Sunset Times

Trigonometric Identities and Equations
    Fundamental Identities
    Verifying Trigonometric Identities
    Sum and difference Identities
    Double-Angle Identities and Half-Angle Identities
    Inverse Trigonometric Functions
    Trigonometric Equations
    Internet Project: Modeling a Damped Pendulum

Applications of Trigonometry
    Oblique Triangles and the Law of Sines
    The Law of Cosines
    Vectors and the Dot Product
    Applications of Vectors
    products and Quotients of Complex Numbers
    De Moivre's Theorem; Powers and Roots of Complex Numbers
    Polar Equations and Graphs
    Parametric Equations, Graphs, and Applications
    Internet Project: The Art of Under Sampling

Systems of Equations and Inequalities
    Linear systems of Equations
    Matrix Solution of Linear Systems
    Determinant Solution of Linear Systems
    Partial Fractions
    Nonlinear Systems of Equations
    Systems of Inequalities and Linear Programming
    Properties of Matrices
    Matrix Inverses
    Internet Project: A Topic from Numerical Analysis

Analytic Geometry
    Parabolas
    Ellipses
    Hyperbolas
    Summary of the Conic Sections; Rectangular and
    Polar Forms
    Rotation of Axes
    Internet Project: Modeling the Path of a Bouncing
    Ball

Further Topics in Algebra
    Sequences and Series
    Arithmetic Sequences and Series
    Geometric Sequences and Series
    The Binomial theorem Revisited
    Mathematical Induction
    Counting Theory
    Basics of Probability
    Internet Project: Simulating Experiments Using
    Random Number Generators