LSU Dual Enrollment Program for Math

COURSE PROFILE

Content Revised 4-4-2022

**COURSE NAME: Advanced Math Precalculus**

**HIGH SCHOOL COURSE CODE: 160346**

**PRIMARY ONLINE CONTENT SOURCE: *Algebra & Trigonometry, 3e,* *MyMathLab*, Kirk Trigsted**

**CARNEGIE CREDIT: 1 Carnegie Unit for full year course**

**GRADE(S): 10, 11, or 12**

**CHAPTERS**

**1 – Equations, Inequalities, and Applications**

**2 – The Rectangular Coordinate System, Lines, and Circles**

**3 – Functions**

**4 – Polynomial and Rational Functions**

**5 – Exponential and Logarithmic Functions and Equations**

**12 – Systems of Equations**

**6 – An Introduction to Trigonometric Functions**

**7 – The Graphs of Trigonometric Functions**

**8 – Trigonometric Identities, Formulas, and Equations**

**9 – Applications of Trigonometry**

**10 – Polar Equations, Complex Numbers, and Vectors**

| **SECTION NAMES (NUMBER OF EXERCISES) AND LEARNING OBJECTIVES** |
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| **CHAPTER 1: Equations, Inequalities, and Applications** |
| **1.1 Linear and Rational Equations (51)**  Recognize linear equations  Solve linear equations with integer coefficients  Solve linear equations involving fractions  Solve linear equations involving decimals  Recognize rational equations  Solve rational equations that lead to linear equations |
| **1.4 Quadratic Equations (44)**  Solve quadratic equations by factoring  Solve quadratic equations using the square root property  Solve quadratic equations using the quadratic formula  Use the discriminant to determine the type of solutions of a quadratic equation |
| **1.6 Other Types of Equations (40)**  Solve higher-order polynomial equations  Solve equations that are quadratic in form  Solve equations involving single radicals |
| **1.7 Linear Inequalities (26)**  Solve linear inequalities in one variable  Solve three-part inequalities in one variable |
| **1.8 Absolute Value Equations and Inequalities (34)**  Solve absolute value equations  Solve absolute value “less than” inequalities  Solve absolute value “greater than” inequalities |
| **CHAPTER 2: The Rectangular Coordinate System, Lines, and Circles** |
| **2.1 The Rectangular Coordinate System (28)**  Plot ordered pairs  Find intercepts of graphs from equations  Find the midpoint of a line segment using the midpoint formula  Find the distance between two points using the distance formula |
| **2.2 Circles (36)**  Write the standard form of an equation of a circle  Find the center, radius, intercepts, and sketch the graph of circles given equations in standard form  Find the center, radius, intercepts, and sketch the graph of circles given equations in general form |
| **2.3 Lines (54)**  Determine the slopes of lines through two given points  Sketch lines given a point and the slope  Find the equation of a line using the point-slope form  Find the equation of a line using the slope-intercept form  Find the equation of a horizontal line and a vertical line  Write the equation of a line in standard form  Find the slope and the y-intercept of a line in standard form  Sketch lines by plotting intercepts  Sketch a line given its equation in standard form |
| **2.4 Parallel and Perpendicular Lines (32)**  Determine whether two lines are parallel, perpendicular, or neither  Find the equations of lines parallel to given lines  Find the equations of lines perpendicular to given lines |
| **CHAPTER 3: Functions** |
| **3.1 Relations and Functions (56)**  Find the domain and range of relations, and determine if relations represent functions  Determine whether equations represent functions  Use function notation and evaluate functions at given values  Determine difference quotients  Use the vertical line test to determine if graphs represent functions  Classify functions as polynomials, rational functions, or root functions, and find their domains |
| **3.2 Properties of a Function’s Graph (42)**  Determine the intercepts of a function  Determine the domain and range of a function from its graph  Determine where functions are increasing, decreasing, or constant  Determine relative maximum and relative minimum values of a function  Determine whether a function if even, odd, or neither  Identify function properties from graphs |
| **3.3 Graphs of Basic Functions; Piecewise Functions (26)**  Sketch the graphs of the basic functions  Sketch graphs of basic functions with restricted domains  Determine functions and their domains from graphs of piecewise-defined functions  Graph and determine properties of piecewise-defined functions |
| **3.4 Transformations of Functions (43)**  Use vertical shifts to graph functions  Use horizontal shifts to graph functions  Use vertical stretches and compressions to graph functions  Use combinations of transformations to graph functions  Use transformations to sketch the graphs of piecewise-defined functions |
| **3.5 Composite Functions (19)**  Find composite functions  Evaluate composite functions at a given point |
| **3.6 One-to-One Functions; Inverse Functions (44)**  Determine if functions are one-to-one  Determine whether a function is one-to-one using the horizontal line test  Verify functions are inverses of one another  Find inverses of one-to-one functions  Sketch the graphs of inverse functions  Use the graphs of functions to determine properties about its inverse |
| **CHAPTER 4: Polynomial and Rational Functions** |
| **4.1 Quadratic Functions (36)**  Determine whether the graph of a quadratic function opens up or down  Determine properties of quadratic function in vertex form and graph the function  Determine properties of quadratic function using the vertex formula and graph the function  Determine the equation of a quadratic function given its graph |
| **4.2 Applications of Quadratic Functions (10)**  Solve applications involving the maximum of projectile motion functions  Solve applications involving the maximum of functions in economics |
| **4.3 Graphs of Polynomial Functions (36)**  Identify polynomial functions and their degree, leading coefficient, and constant coefficient  Sketch the graphs of power functions using transformations  Use the end behavior of polynomial functions to describe the equation of the function  Determine the intercepts of a polynomial function  Determine the real zeros of polynomial functions and their multiplicities  Sketch the graph of a polynomial function using the four-step process  Determine a possible equation of a polynomial function given its graph |
| **4.6 Rational Functions and Their Graphs (36)**  Find the domain and intercepts of rational functions  Identify vertical asymptotes  Identify horizontal asymptotes  Use transformations to sketch the graphs of rational functions  Find removable discontinuities, intercepts, and asymptotes and sketch graphs of rational functions |
| **CHAPTER 5: Exponential and Logarithmic Functions and Equations** |
| **5.1 Exponential Functions (46)**  Evaluate exponential expressions  Sketch the graphs of exponential functions  Determine possible equations of exponential functions given their graphs  Sketch the graphs of exponential functions using transformations  Solve exponential equations by relating the bases  Solve applications involving exponential functions |
| **5.2 Logarithmic Functions (656**  Change equations between exponential form and logarithmic form  Evaluate logarithmic expressions  Use properties of logarithms to evaluate expressions  Use common and natural logarithms  Sketch the graphs of logarithmic functions  Find the domain of logarithmic functions |
| **5.3 Properties of Logarithms (44)**  Expand and evaluate logarithmic expressions using properties of logarithms  Condense and evaluate logarithmic expressions using properties of logarithms  Solve logarithmic equations using the logarithm property of equality  Use the change of base formula to approximate logarithmic expressions |
| **5.4 Exponential and Logarithmic Equations (40)**  Solve exponential equations  Solve logarithmic equations |
| **5.5 Applications of Exponential and Logarithmic Functions (16)**  Solve applications involving compound interest  Solve exponential growth and decay applications |
| **CHAPTER 12: Systems of Equations** |
| **12.1 Systems of Linear Equations in Two Variables (13)**  Verify solutions to a system of linear equations in two variables  Solve systems of linear equations using the substitution method  Solve systems of linear equations using the elimination method  Solve systems of linear equations in two variables using either method  Solve applied problems using a system of linear equation |
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| **CHAPTER 6: An Introduction to Trigonometric Functions** |
| **6.1 An Introduction to Angles: Degree and Radian Measure (58)**  Understand degree measure  Understand radian measure  Convert between degree measure and radian measure  Find coterminal angles using degree measure  Find coterminal angles using radian measure |
| **6.3 Triangles (17)**  Classify triangles  Use the Pythagorean Theorem  Understand similar triangles  Understand the special right triangles |
| **6.4 Right Triangle Trigonometry (55)**  Understand the right triangle definitions of the trigonometric functions  Use the special right triangles  Understand the fundamental trigonometric identities  Understand cofunctions  Evaluate trigonometric functions using a calculator |
| **6.5 Trigonometric Functions of General Angles (77)**  Understand the four families of special angles  Understand the definitions of the trigonometric functions of general angles  Find the values of the trigonometric functions of quadrantal angles  Understand the signs of the trigonometric functions  Determine reference angles  Evaluate trigonometric functions of angles belonging to the families |
| **6.6 The Unit Circle (9)**  Understand the definition of the unit circle  Understand the unit circle definitions of the trigonometric functions |
| **CHAPTER 7: The Graphs of Trigonometric Functions** |
| **7.1 Graphs of Sine and Cosine Functions (46)**  Understand the graph of the sine function and its properties  Understand the graph of the cosine function and its properties  Determine properties and sketch graphs of the form  and  Determine properties and sketch graphs of the form  and  Determine properties and sketch graphs of the form  and  Determine the equation of a function of the form  and  given its graph |
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| **7.2 Graphs of Sine and Cosine: Phase Shift & Vertical Shift (20)**  Determine properties and sketch graphs of the form  and  Determine properties and sketch graphs of the form  and |
| Determine properties and sketch graphs of the form  and  Determine the equation of a function of the form  and  given its graph |
| **7.3 Graphs of Secant, Cosecant, Tangent, and Cotangent (10)**  Understand the graph of the tangent function and its properties  Understand the graph of the cotangent function and its properties  Understand the graphs of the cosecant and secant functions and their properties |
| **7.4 Inverse Trigonometric Functions Part I (34)**  Understand and find the exact and approximate values of the inverse sine function  Understand and find the exact and approximate values of the inverse cosine function  Understand and find the exact and approximate values of the inverse tangent function |
| **CHAPTER 8: Trigonometric Identities, Formulas, and Equations** |
| **8.1 Trigonometric Identities (35)**  Review and use the fundamental identities  Verify trigonometric identities |
| **8.2 The Sum and Difference Formulas (48)**  Use the sum and difference formulas for the cosine function  Use the sum and difference formulas for the sine function  Use the sum and difference formulas for the tangent function  Use the sum and difference formulas to verify identities  Use sum and difference formulas to evaluate expressions involving inverse trig functions |
| **8.5 Trigonometric Equations (32)**  Solve trigonometric equations that are quadratic in form  Solve trigonometric equations using identities  Solve trigonometric equations using a calculator |
| **CHAPTER 9: Applications of Trigonometry** |
| **9.1 Right Triangle Applications (16)**  Solve right triangles  Solve applied problems using right triangles |
| **9.2 The Law of Sines (31)**  Determine if the Law of Sines can be used to solve an oblique triangle  Use the Law of Sines to solve the SAA case or the ASA case  Use the Law of Sines to solve the SSA (ambiguous) case  Use the Law of Sines to solve applied problems involving oblique triangles |
| **9.3 The Law of Cosines (26)**  Determine whether Law of Sines or Cosines should be used to solve an oblique triangle  Use the Law of Cosines to solve the SAS case  Use the Law of Cosines to solve the SSS case  Use the Law of Cosines to solve applied problems involving oblique triangles |
| **9.4 Area of Triangles (17)**  Determine the area of oblique triangles  Use Heron’s Formula to determine the area of an SSS triangle  Solve applied problems involving the area of triangles |
| **CHAPTER 10: Polar Equations, Complex Numbers, and Vectors** |
| **10.1 Polar Coordinates and Equations (63)**  Plot points using polar coordinates  Determine different representations of a point  Convert from polar to rectangular coordinates  Convert from rectangular to polar coordinates  Convert equations from rectangular to polar form  Convert equations from polar to rectangular form |
| **10.2 Graphing Polar Equations (35)**  Sketch equations of the form , , , and  Sketch equations of the form *, ,* and  Sketch equations of the form and |