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 equationsSolve linear equations with integer coefficientsSolve linear equations involving fractionsSolve linear equations involving decimalsRecognize rational equationsSolve rational equations that lead to linear equations |
| **1.4 Quadratic Equations (44)**Solve quadratic equations by factoringSolve quadratic equations using the square root propertySolve quadratic equations using the quadratic formulaUse the discriminant to determine the type of solutions of a quadratic equation |
| **1.6 Other Types of Equations (40)**Solve higher-order polynomial equationsSolve equations that are quadratic in formSolve equations involving single radicals |
| **1.7 Linear Inequalities (26)**Solve linear inequalities in one variableSolve three-part inequalities in one variable |
| **1.8 Absolute Value Equations and Inequalities (34)**Solve absolute value equationsSolve absolute value “less than” inequalitiesSolve absolute value “greater than” inequalities |
| **CHAPTER 2: The Rectangular Coordinate System, Lines, and Circles** |
| **2.1 The Rectangular Coordinate System (28)** Plot ordered pairsFind intercepts of graphs from equationsFind the midpoint of a line segment using the midpoint formulaFind the distance between two points using the distance formula |
| **2.2 Circles (36)**Write the standard form of an equation of a circleFind the center, radius, intercepts, and sketch the graph of circles given equations in standard formFind 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 slopeFind the equation of a line using the point-slope formFind the equation of a line using the slope-intercept formFind the equation of a horizontal line and a vertical lineWrite the equation of a line in standard formFind the slope and the y-intercept of a line in standard formSketch lines by plotting interceptsSketch a line given its equation in standard form |
| **2.4 Parallel and Perpendicular Lines (32)**Determine whether two lines are parallel, perpendicular, or neitherFind the equations of lines parallel to given linesFind 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 functionsDetermine whether equations represent functionsUse function notation and evaluate functions at given valuesDetermine difference quotientsUse the vertical line test to determine if graphs represent functionsClassify 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 functionDetermine the domain and range of a function from its graphDetermine where functions are increasing, decreasing, or constantDetermine relative maximum and relative minimum values of a functionDetermine whether a function if even, odd, or neitherIdentify function properties from graphs |
| **3.3 Graphs of Basic Functions; Piecewise Functions (26)**Sketch the graphs of the basic functionsSketch graphs of basic functions with restricted domainsDetermine functions and their domains from graphs of piecewise-defined functionsGraph and determine properties of piecewise-defined functions |
| **3.4 Transformations of Functions (43)**Use vertical shifts to graph functionsUse horizontal shifts to graph functionsUse vertical stretches and compressions to graph functionsUse combinations of transformations to graph functionsUse transformations to sketch the graphs of piecewise-defined functions |
| **3.5 Composite Functions (19)**Find composite functionsEvaluate composite functions at a given point |
| **3.6 One-to-One Functions; Inverse Functions (44)**Determine if functions are one-to-oneDetermine whether a function is one-to-one using the horizontal line testVerify functions are inverses of one anotherFind inverses of one-to-one functionsSketch the graphs of inverse functionsUse 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 downDetermine properties of quadratic function in vertex form and graph the functionDetermine properties of quadratic function using the vertex formula and graph the functionDetermine the equation of a quadratic function given its graph |
| **4.2 Applications of Quadratic Functions (10)**Solve applications involving the maximum of projectile motion functionsSolve 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 coefficientSketch the graphs of power functions using transformationsUse the end behavior of polynomial functions to describe the equation of the functionDetermine the intercepts of a polynomial functionDetermine the real zeros of polynomial functions and their multiplicitiesSketch the graph of a polynomial function using the four-step processDetermine 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 functionsIdentify vertical asymptotesIdentify horizontal asymptotesUse transformations to sketch the graphs of rational functionsFind 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 expressionsSketch the graphs of exponential functionsDetermine possible equations of exponential functions given their graphsSketch the graphs of exponential functions using transformationsSolve exponential equations by relating the basesSolve applications involving exponential functions |
| **5.2 Logarithmic Functions (656**Change equations between exponential form and logarithmic formEvaluate logarithmic expressionsUse properties of logarithms to evaluate expressionsUse common and natural logarithmsSketch the graphs of logarithmic functionsFind the domain of logarithmic functions |
| **5.3 Properties of Logarithms (44)**Expand and evaluate logarithmic expressions using properties of logarithmsCondense and evaluate logarithmic expressions using properties of logarithmsSolve logarithmic equations using the logarithm property of equalityUse the change of base formula to approximate logarithmic expressions |
| **5.4 Exponential and Logarithmic Equations (40)**Solve exponential equationsSolve logarithmic equations |
| **5.5 Applications of Exponential and Logarithmic Functions (16)**Solve applications involving compound interestSolve 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 variablesSolve systems of linear equations using the substitution methodSolve systems of linear equations using the elimination methodSolve systems of linear equations in two variables using either methodSolve 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 measureUnderstand radian measureConvert between degree measure and radian measureFind coterminal angles using degree measureFind coterminal angles using radian measure |
| **6.3 Triangles (17)**Classify trianglesUse the Pythagorean TheoremUnderstand similar trianglesUnderstand the special right triangles |
| **6.4 Right Triangle Trigonometry (55)**Understand the right triangle definitions of the trigonometric functionsUse the special right trianglesUnderstand the fundamental trigonometric identitiesUnderstand cofunctionsEvaluate trigonometric functions using a calculator |
| **6.5 Trigonometric Functions of General Angles (77)**Understand the four families of special anglesUnderstand the definitions of the trigonometric functions of general anglesFind the values of the trigonometric functions of quadrantal anglesUnderstand the signs of the trigonometric functionsDetermine reference anglesEvaluate trigonometric functions of angles belonging to the families |
| **6.6 The Unit Circle (9)**Understand the definition of the unit circleUnderstand 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 propertiesUnderstand the graph of the cosine function and its propertiesDetermine 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 propertiesUnderstand the graph of the cotangent function and its propertiesUnderstand 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 functionUnderstand and find the exact and approximate values of the inverse cosine functionUnderstand 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 identitiesVerify trigonometric identities |
| **8.2 The Sum and Difference Formulas (48)**Use the sum and difference formulas for the cosine functionUse the sum and difference formulas for the sine functionUse the sum and difference formulas for the tangent functionUse the sum and difference formulas to verify identitiesUse sum and difference formulas to evaluate expressions involving inverse trig functions |
| **8.5 Trigonometric Equations (32)** Solve trigonometric equations that are quadratic in formSolve trigonometric equations using identitiesSolve trigonometric equations using a calculator |
| **CHAPTER 9: Applications of Trigonometry** |
| **9.1 Right Triangle Applications (16)**Solve right trianglesSolve 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 triangleUse the Law of Sines to solve the SAA case or the ASA caseUse the Law of Sines to solve the SSA (ambiguous) caseUse 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 triangleUse the Law of Cosines to solve the SAS caseUse the Law of Cosines to solve the SSS caseUse the Law of Cosines to solve applied problems involving oblique triangles |
| **9.4 Area of Triangles (17)** Determine the area of oblique trianglesUse Heron’s Formula to determine the area of an SSS triangleSolve 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 coordinatesDetermine different representations of a point Convert from polar to rectangular coordinatesConvert from rectangular to polar coordinatesConvert equations from rectangular to polar formConvert equations from polar to rectangular form |
| **10.2 Graphing Polar Equations (35)** Sketch equations of the form , , , and Sketch equations of the form *, ,* andSketch equations of the form and  |