LSU Dual Enrollment Program for Math

COURSE PROFILE

Content Revised 4-4-2022

**COURSE NAME: Advanced Math – Functions and Statistics (1 semester, prep for LSU’s Math 1029\*)**

**HIGH SCHOOL COURSE CODE: 160347\***

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

**CARNEGIE CREDIT: ½ Carnegie Unit for fall semester**

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

**\*The content described below on functions is designed to be taught in the fall semester as the first half of Functions and Statistics and then paired with Math 1029 Contemporary Math (1 Carnegie unit) for dual enrollment in the spring semester. Math 1029 will provide the statistics, counting, and probability portion of the content.**

**CHAPTERS**

**R – Review**

**1 – Equations and Inequalities**

**3 – Functions**

**4 – Polynomial and Rational Functions**

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

**6 – An Introduction to Trigonometric Functions**

**7 – The Graphs of Trigonometric Functions**

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

**9 – Applications of Trigonometry**

| **SECTION NAMES (NUMBER OF EXERCISES) AND LEARNING OBJECTIVES** |
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| **CHAPTER R: Review** |
| **R.1 Real Numbers (24)**  Understand and classify real numbers  Describe sets of numbers using set-builder notation and interval notation  Evaluate absolute value expressions  Find the distance between two numbers using absolute value |
| **R.2 Order of Operations and Algebraic Expressions (29)**  Use the properties of real numbers to rewrite expressions  Rewrite expressions using exponential notation  Identify the base and exponent of an expression and evaluate  Use the order of operations to simplify numeric and algebraic expressions  Evaluate algebraic expressions for given values of variables |
| **R.3 Laws of Exponents; Radicals (46)**  Simplify exponential expressions involving integer exponents  Evaluate radicals  Simplify expressions of the form *n*th root of  Simplify exponential expressions involving rational exponents  Simplify radical expressions using the product rule  Simplify radical expressions using the quotient rule |
| **R.4 Polynomials (29)**  Determine whether an algebraic expression is a monomial and state the degree and the coefficient  Add and subtract polynomials  Multiply polynomials |
| **R.5 Operations with Radicals (11)**  Add, subtract, and multiply radical expressions |
| **R.6 Factoring Polynomials (37)**  Factor out a greatest common factor  Factor by grouping  Factor trinomials with a leading coefficient equal to one  Factor trinomials with a leading coefficient not equal to one  Factor using special factoring formulas |
| **R.7 Rational Expressions (21)**  Simplify rational expressions  Add and subtract rational expressions  Simplify complex rational expressions |
| **CHAPTER 1: Equations, Inequalities, and Applications** |
| **1.1 Linear and Rational Equations (47)**  Recognize linear equations  Solve linear equations with integer coefficients  Solve linear equations involving fractions  Solve linear equations involving decimals  Solve equations that lead to linear equations |
| **1.4 Quadratic Equations (46)**  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 |
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| **CHAPTER 3: Functions** |
| **3.1 Relations and Functions (62)**  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 a graph represents a function  Classify functions as polynomials, rational functions, or root functions, and find their domains |
| **3.2 Properties of a Function’s Graph (47)**  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 is even, odd, or neither  Identify function properties from graphs |
| **3.3 Graphs of Basic Functions; Piecewise Functions (38)**  Sketch the graphs of 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 (51)**  Use vertical shifts to graph functions  Use horizontal shifts 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 value of *x* |
| **3.6 One-to-One Functions; Inverse Functions (44)**  Determine if a function is one-to-one  Verify functions are inverses of one another  Find the inverse of a one-to-one function  Sketch the graphs of inverse functions  Use the graph of a function to determine properties about its inverse |
| **CHAPTER 4: Polynomial and Rational Functions** |
| **4.1 Quadratic Functions (38)**  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 (46)**  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 (41)**  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 (54)**  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 |
| **5.2 Logarithmic Functions (61)**  Change between exponential form and logarithmic form  Evaluate logarithmic expressions  Use properties of logarithms to evaluate expressions  Sketch the graphs of logarithmic functions  Find the domain and range of logarithmic functions |
| **5.3 Properties of Logarithms (44)**  Expand and evaluate logarithmic expressions  Condense and evaluate logarithmic expressions  Use the logarithm property of equality to solve logarithmic equations  Use the change of base formula to approximate logarithmic expressions  Use the change of base formula to solve logarithmic equations |
| **5.4 Exponential and Log Equations (43)**  Solve exponential equations  Solve logarithmic equations |
| **5.5 Applications of Exponential Functions (20)**  Solve applications involving exponential functions  Solve applications involving compound interest  Solve applications involving exponential growth and decay |
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| **CHAPTER 6: An Introduction to Trigonometric Functions** |
| **6.1 Intro to Angles (58)**  Draw angles in standard position using degree measure  Draw angles in standard position using radian measure  Convert between degree measure and radian measure  Find coterminal angles using degree measure  Find coterminal angles using radian measure |
| **6.2 Applications of Radian Measure (11)**  Determine the area of a sector of a circle  Compute the arc length of a sector of a circle |
| **6.3 Triangles (15)**  Classify triangles  Use the Pythagorean Theorem  Find missing sides of similar triangles  Find missing sides of special right triangles |
| **6.4 Right Triangle Trigonometry (37)**  Evaluate trig functions of an acute angle in a right triangle  Use special right triangles to evaluate trig expressions  Understand the fundamental trigonometric identities to evaluate trigonometric expressions  Evaluate trigonometric functions using a calculator |
| **6.5 Trigonometric Functions of General Angles (55)**  Understand the four families of special angles  Determine the special angle family to which a given angle belongs  Find the six trigonometric functions of an angle given a point lying on its terminal side  Find the values of the trigonometric functions of quadrantal angles  Identify the quadrants where a trigonometric function is positive and where it is negative  Understand the signs of the trigonometric functions  Determine reference angles  Evaluate trigonometric functions of angles belonging to  families |
| **6.6 The Unit Circle (7)**  Determine the missing coordinate of a point that lies on the graph of the unit circle  Find the values of the six trigonometric functions given a point that lies on the graph of the unit circle |
| **CHAPTER 7: The Graphs of Trigonometric Functions** |
| **7.1 Graphs of Sine and Cosine Functions (33)**  Identify properties of the sine and cosine functions and find equivalent expressions  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 |
| **CHAPTER 8 Trigonometric Identities, Formulas, and Equations** |
| **8.5 Trig Equations (29)**  Solve trigonometric equations that are linear in form  Solve trigonometric equations that are quadratic in form  Solve trigonometric equations using a calculator |
| **CHAPTER 9: Applications of Trigonometry** |
| **9.1 Right Triangle Applications (15)**  Solve right triangles  Solve applications using right triangles |
| **9.2 The Law of Sines (27)**  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 |
| **9.3 The Law of Cosines (19)**  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 applications 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 applications involving the area of triangles |