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 numbersDescribe sets of numbers using set-builder notation and interval notationEvaluate absolute value expressionsFind 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 expressionsRewrite expressions using exponential notationIdentify the base and exponent of an expression and evaluateUse the order of operations to simplify numeric and algebraic expressionsEvaluate algebraic expressions for given values of variables |
| **R.3 Laws of Exponents; Radicals (46)**Simplify exponential expressions involving integer exponentsEvaluate radicalsSimplify expressions of the form *n*th root of Simplify exponential expressions involving rational exponentsSimplify radical expressions using the product ruleSimplify radical expressions using the quotient rule |
| **R.4 Polynomials (29)**Determine whether an algebraic expression is a monomial and state the degree and the coefficientAdd and subtract polynomialsMultiply polynomials |
| **R.5 Operations with Radicals (11)**Add, subtract, and multiply radical expressions |
| **R.6 Factoring Polynomials (37)**Factor out a greatest common factorFactor by groupingFactor trinomials with a leading coefficient equal to oneFactor trinomials with a leading coefficient not equal to oneFactor using special factoring formulas |
| **R.7 Rational Expressions (21)**Simplify rational expressionsAdd and subtract rational expressionsSimplify complex rational expressions |
| **CHAPTER 1: Equations, Inequalities, and Applications**  |
| **1.1 Linear and Rational Equations (47)**Recognize linear equationsSolve linear equations with integer coefficientsSolve linear equations involving fractionsSolve linear equations involving decimalsSolve equations that lead to linear equations |
| **1.4 Quadratic Equations (46)**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 |
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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 functionsDetermine whether equations represent functionsUse function notation and evaluate functions at given valuesDetermine difference quotientsUse the vertical line test to determine if a graph represents a functionClassify 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 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 is even, odd, or neitherIdentify function properties from graphs |
| **3.3 Graphs of Basic Functions; Piecewise Functions (38)**Sketch the graphs of 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 (51)**Use vertical shifts to graph functionsUse horizontal shifts 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 value of *x* |
| **3.6 One-to-One Functions; Inverse Functions (44)**Determine if a function is one-to-oneVerify functions are inverses of one anotherFind the inverse of a one-to-one functionSketch the graphs of inverse functionsUse 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 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 (46)**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 (41)**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 (54)**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 bases |
| **5.2 Logarithmic Functions (61)**Change between exponential form and logarithmic formEvaluate logarithmic expressionsUse properties of logarithms to evaluate expressionsSketch the graphs of logarithmic functionsFind the domain and range of logarithmic functions |
| **5.3 Properties of Logarithms (44)**Expand and evaluate logarithmic expressionsCondense and evaluate logarithmic expressionsUse the logarithm property of equality to solve logarithmic equationsUse the change of base formula to approximate logarithmic expressionsUse the change of base formula to solve logarithmic equations |
| **5.4 Exponential and Log Equations (43)**Solve exponential equationsSolve logarithmic equations |
| **5.5 Applications of Exponential Functions (20)**Solve applications involving exponential functionsSolve applications involving compound interestSolve 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 measureDraw angles in standard position using radian measureConvert between degree measure and radian measureFind coterminal angles using degree measureFind coterminal angles using radian measure |
| **6.2 Applications of Radian Measure (11)**Determine the area of a sector of a circleCompute the arc length of a sector of a circle |
| **6.3 Triangles (15)**Classify trianglesUse the Pythagorean TheoremFind missing sides of similar trianglesFind missing sides of special right triangles |
| **6.4 Right Triangle Trigonometry (37)**Evaluate trig functions of an acute angle in a right triangleUse special right triangles to evaluate trig expressionsUnderstand the fundamental trigonometric identities to evaluate trigonometric expressionsEvaluate trigonometric functions using a calculator |
| **6.5 Trigonometric Functions of General Angles (55)**Understand the four families of special anglesDetermine the special angle family to which a given angle belongsFind the six trigonometric functions of an angle given a point lying on its terminal sideFind the values of the trigonometric functions of quadrantal anglesIdentify the quadrants where a trigonometric function is positive and where it is negativeUnderstand the signs of the trigonometric functionsDetermine reference anglesEvaluate 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 circleFind 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 expressionsDetermine 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 formSolve trigonometric equations that are quadratic in formSolve trigonometric equations using a calculator |
| **CHAPTER 9: Applications of Trigonometry** |
| **9.1 Right Triangle Applications (15)**Solve right trianglesSolve applications using right triangles |
| **9.2 The Law of Sines (27)** 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) case |
| **9.3 The Law of Cosines (19)** 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 applications 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 applications involving the area of triangles |