

<b>DEPARTMENT: MATHEMATICS</b>	<b>COURSE TITLE: MATH MODELING</b> <b>COURSE NUMBER: 332</b>
<b>GRADE(S): 11, 12</b>	<b>PRE-REQUISITES (IF ANY): C- OR BETTER IN ALGEBRA II</b>

<b>UNIT</b>	<b>LENGTH</b>	<b>CONTENT</b>	<b>SKILLS</b>	<b>METHODS OF ASSESSMENT</b>	<b>FRAMEWORK STRAND(S) &amp; STANDARD(S)</b>
Introduction to Math Modeling	12 days	<ul style="list-style-type: none"> <li>Review of graphs, equations and properties of linear and quadratic functions</li> <li>Use of graphing calculators</li> <li>Explore a range of different data sets to determine the type of model best suited for the data</li> <li>Introduce the concept of residuals and median-median lines as a test of accuracy for the line of best fit</li> <li>Investigate methods for revising and refining the constructed model</li> <li>Student generated questions that can be investigated with the model</li> </ul>	<ul style="list-style-type: none"> <li>Recognize and understand the graphs of linear and quadratics</li> <li>Find the linear and quadratic equation from the given data</li> <li>Be able to use a graphing calculator to plot the data set</li> <li>Be able to find residuals manually and with a graphing calculator</li> <li>Understand the criteria for determining a best fit model</li> <li>To find a median-median line both manually and with a graphing calculator</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Test</li> <li>Project</li> </ul>	
Exploring other functions	12 days	<ul style="list-style-type: none"> <li>Using data sets to investigate the equations, graphs and characteristics of: square root functions, power functions, reciprocal functions</li> <li>Use techniques from unit one with functions from this unit</li> </ul>	<ul style="list-style-type: none"> <li>Recognize and analyze graphs of square root functions, power functions and reciprocal functions</li> <li>Sketch the graph if given an equation</li> <li>Approximate an equation if given a graph</li> <li>Determine the appropriate equation to model the given data set</li> <li>To evaluate how well the chosen function fit the data</li> <li>Be able to use a graphing calculator to graph the functions of the unit</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Test</li> <li>Project</li> <li>Comparison Paper</li> </ul>	12.P.6 12.P.8 12.P.13
Function Inverses	10 days	<ul style="list-style-type: none"> <li>Definition, range, domain, graphs, properties</li> <li>Experience in finding inverses</li> <li>Analysis of, and real world interpretation of, function inverses</li> </ul>	<ul style="list-style-type: none"> <li>Understand and use the appropriate vocabulary and notation</li> <li>Given a graph of a function determine if it has an inverse</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Test</li> <li>Project</li> <li>Graded assignment</li> </ul>	12.P.5

			<ul style="list-style-type: none"> <li>Given a function graph, be able to sketch its inverse</li> <li>Given a function, be able to find an equation for its inverse</li> </ul>		
Exponential and Logarithmic Functions	12days	<ul style="list-style-type: none"> <li>Data modeled by exponential functions.</li> <li>Equations, graphs, and characteristics of exponential functions</li> <li>Experiences in constructing exponential models with given sets of data</li> <li>Inverses of exponential functions (logarithms)</li> <li>Equations, graphs, properties, and applications of logarithms</li> <li>Natural logs and their applications</li> </ul>	<ul style="list-style-type: none"> <li>Recognize graphs and equations of exponential and logarithmic functions</li> <li>Apply exponential and logarithmic functions to the real world and solve problems</li> <li>Use the proper notations and vocabulary</li> <li>Be able to use exponential and logarithmic equations to model the data set</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Test</li> <li>Graded assignment</li> </ul>	12.N.2 12.P.4 12.P.6 12.P.11
Data analysis	12 days	<ul style="list-style-type: none"> <li>Curve straightening</li> <li>Linear Least Square</li> <li>Determining the best fit line</li> <li>Comparing Median-Median line to Least Square line</li> <li>Regression</li> </ul>	<ul style="list-style-type: none"> <li>Be able to apply the techniques of log-log and semi-log curve straightening to find the best-fit model for non-linear data</li> <li>To measure the accuracy of a model using residuals</li> <li>To understand the definition of best-fit</li> <li>Understand and use the Least Square principle</li> <li>Understand the advantages and disadvantages of the Median-Median line and the Least Square line when modeling data</li> <li>To be able to use a graphing calculator to find the regression model for the given data</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Test</li> <li>Quiz</li> <li>Graded assignment</li> <li>Project</li> </ul>	12.P.6 12.P.8 12.D.3
Introduction to Trigonometry	20 days	<ul style="list-style-type: none"> <li>Periodic functions</li> <li>Unit circle and radian measure</li> <li>Basic definitions of sine, cosine and tangent</li> <li>Angle measurement</li> <li>Historical background</li> </ul>	<ul style="list-style-type: none"> <li>Understand and be familiar with radian measure</li> <li>To convert between radian and degree measurement</li> <li>Understand and use formulas related sectors</li> <li>Understand and use Polar coordinates</li> </ul>	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Test</li> <li>Project</li> <li>Graded assignment</li> </ul>	12.P.4 12.P.6 12.G.1 12.M.1

			<ul style="list-style-type: none"> <li>• Convert between Polar and Rectangular coordinate systems</li> <li>• To be able to find the exact value when possible for basic trigonometric ratios</li> <li>• Use a calculator to find the decimal approximation of the basic trigonometric ratio</li> <li>• Understand and use the definitions of sine, cosine and tangent functions</li> </ul>		
Graphs of the trig functions	20days	<ul style="list-style-type: none"> <li>• Period, amplitude, and frequency</li> <li>• Translations</li> <li>• Using graphs to solve trig equations</li> <li>• Algebraic solutions for trig equations</li> <li>• Modeling trig functions</li> </ul>	<ul style="list-style-type: none"> <li>• To be able to find Period, Amplitude and Frequency from both equations and graphs</li> <li>• To be able to determine an equation given a graph</li> <li>• To be able to sketch an undistorted graph from its equation</li> <li>• To be able to solve simple equations algebraically</li> <li>• To be able to graph trig functions and solve equations using a graphing calculator</li> <li>• Use trig functions to model the real world situations</li> <li>• Use trig functions to model data</li> </ul>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Test</li> <li>• Project</li> <li>• Graded assignment</li> </ul>	12.P.6 12.P.8 12.P.11
Triangle Trigonometry	20 days	<ul style="list-style-type: none"> <li>• Applications of solving right triangles</li> <li>• Finding areas of non-right triangles</li> <li>• Law of Sines</li> <li>• Law of Cosines</li> <li>• Navigation and surveying applications</li> </ul>	<ul style="list-style-type: none"> <li>• Use trig relationship to find unknown quantities in right triangles</li> <li>• Solve real world problems that involve right triangles</li> <li>• Understand and use trigonometric area formulas</li> <li>• Understand and use law of sine and cosine</li> <li>• To solve navigation and surveying problems using the skills of this unit</li> </ul>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Test</li> <li>• Project</li> <li>• Graded assignment</li> </ul>	12.G.2