



**EFFECTIVE: SEPTEMBER 2010**  
**CURRICULUM GUIDELINES**

**A.** Division: Education Effective Date: September 2010

**B.** Department / Program Area: Mathematics/  
Faculty of Science & Technology

Revision  New Course

If Revision, Section(s)

**M:** Course Objectives / Learning Outcomes

Upon completion of MATH 1110 the student should be able to:

-----FUNCTIONS-----

-understand the concept of function and be able to determine which relations are functions by an examination of the equation and/or the graph of the relation.

-find the domain of any function and the range of functions for which the inverse can be determined or for which the graph can be easily sketched.

-extract the functional rule from a 'word problem'.

-determine if a function is odd or even and understand the graphical implication of the property.

-sketch the graphs of the following functions:

$$y = x, y = x^2, y = x^3, y = |x|, y = \sqrt{x}, y = \frac{1}{x}, y = \frac{1}{x^2}, y = \sqrt{a^2 - x^2}, y = |x|$$

and the graphs of the following variations of the above functions:

$$y = f(x) + c, y = f(x - c), y = f(x), y = cf(x)$$

-apply the above transformations to any given graph or function.

-sketch the graph of simple piece-wise defined functions.

-sketch the graph of any quadratic function and be able to determine all intercepts and the vertex using the quadratic formula and/or completing the square.

-determine the equation of a quadratic from its graphical properties.

-solve maximum-minimum 'word problems' involving a quadratic function.

-add, subtract, multiply and divide functions and be able to determine the domains of the resulting functions.

-determine the composite of several functions and its domain.

-determine the inverse of a given one-to-one function and the domain and range of the inverse function.

-prove that a given function is the inverse of another given function.

-sketch the graph of the inverse of a given one-to-one function when the inverse functional rule cannot be determined.

-understand the polar coordinate system and be able to graph a function written in polar coordinates. (optional)

-sketch the graph of a plane curve given by a set of parametric equations. (optional)

-find parametric equations of basic plane curves. (optional)

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-use the factor theorem to find the real roots of polynomial equations and the real zeros of polynomial functions.

-determine the multiplicity of zeros.

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-find the exact values of the trigonometric functions for an angle in standard position given a point on the terminal side.

-find the reference angle of any angle in degrees and/or radians.

-express any trigonometric function as a function of a given trigonometric function.

-recall the exact values of the trigonometric functions for reference angles of  $30^\circ$ ,  $45^\circ$ , and  $60^\circ$  and the axis angles.

-use a calculator to approximate the value of the trigonometric function of any real number.

-use a calculator to approximate the reference angle given the value of the trigonometric function.

-determine the amplitude, period and the phase shift of any trigonometric function and sketch its graph showing all intercepts and turning points.

-demonstrate an understanding of the terms 'angle of depression' and 'angle of elevation' and solve 'word problems' involving right triangles.

-----ANALYTIC TRIGONOMETRY AND APPLICATIONS-----

-recall or derive and demonstrate an understanding of the addition and subtraction formulas, the double angle formulas and the half-angle identities for sine, cosine and tangent.

-demonstrate an understanding of the product-to-sum and sum-to-product formulas when given the formulas.

-combine a sine function and a cosine function of the same period into a single cosine function when given the formula.

-verify trigonometric identities.

-find all the solutions of trigonometric equations and find solutions on a restricted interval.

-sketch graphs of the six inverse trigonometric functions and state the domain and range of each function.

-sketch the graph of simple inverse trigonometric functions.

-find the exact value of inverse trigonometric expressions.

-simplify given composites of trigonometric and inverse trigonometric functions.

-solve 'word problems' that require the use of the inverse trigonometric functions.

-verify inverse trigonometric identities.

-solve 'word problems' that require the use of the Law of Sines and/or Law of Cosines.

-----PARABOLAS, ELLIPSES AND HYPERBOLAS-----

-find the vertex, focus and directrix of a parabola and sketch its graph.

-find the vertices and foci of an ellipse and sketch its graph.

-find the vertices and equations of the asymptotes of a hyperbola and sketch its graph.

-find an equation of a parabola or ellipse that satisfies given conditions.

**N:** Course Content:

1. General Functions
2. Polynomial and Rational Functions
3. Exponential and Logarithmic Functions
4. Trigonometric Functions
5. Analytic Trigonometry and Applications
6. Conics