MATH 1040 (COLLEGE ALGEBRA) SYLLABUS

UNIT 1

Topic	Objectives
Linear and rational equations	- Solve linear equations in one variable 2-step - Variable on both sides - Distribution - Solve linear equations containing fractions - Multiply both sides by the common denominator to clear fractions - Solve rational equations (variables in denominator) - Categorize identities, conditional equations, and inconsistent equations
Models and Applications	- Use linear equations to solve problems - Choose between two pricing plans - Percent discount/tax problems - Perimeter problems
Complex Numbers	- Add and subtract complex numbers - Multiply complex numbers - Divide complex numbers - Perform operations with square roots of negative numbers
Quadratic Equations	- Identify quadratic equation format and contrast with linear - Solve quadratic equations by factoring - Solve quadratic equations by the square root property - Solve quadratic equations by completing the square - Solve quadratic equations using the quadratic formula - Solve problems modeled by quadratic equations - Pythagorean Theorem
Other types of equations	- Solve polynomials by factoring - Solve radical equations - Equations involving fractional powers - Quadratic form - Absolute value
Inequalities	- Use interval notation - Solve linear inequalities - Solve compound inequalities - Solve absolute value inequalities
Basics of Functions and Their Graphs	- Define relations and functions - Find the domain and range of relation - Determine whether a relation is a function - Evaluate a function - At a number - At a variable - At an expression - Use graphs to evaluate functions and determine domain and range

Topic	Objectives

More on Functions and Their Graphs	• Identify intervals on which a function increases, decreases, or is constant
	• Use graphs to locate relative maxima or minima
	• Identify even or odd functions
	    ○ Graphically
	    ○ Algebraically

Linear Functions and Slope	• Calculate a line's slope from a pair of points • Write point-slope form of the equation of a line $y - y_1 = m(x - x_1)$ • Write and graph the slope-intercept form of the equation of a line $y = mx + b$ • Standard form • Find slopes and equations of parallel and perpendicular lines • Interpret slope as rate of change

UNIT 2

Section	Objectives

Graphical Transformations	• Recognize graphs of common functions
	    ○ Constant
	    ○ Identity
	    ○ Absolute value
	    ○ Quadratic
	    ○ Square root
	    ○ Cubic
	    ○ Cube root
	• Apply transformations and graph by hand
	• Find the domain of a function

Combinations of Functions and Compositions	• Combine functions (add, subtract, multiply, and divide) • Form composite functions • Write functions as compositions
Inverse Functions	• Verify inverse functions • Find the inverse of a function • One-to-one functions • Use a graph to graph the inverse
Distance and Midpoint Formulas; Circles	• Find the distance between two points • Find the midpoint of a line segment • Write the standard form of a circle's equation • Give the center and radius of a circle from standard form • Convert general form to standard form

Quadratic Functions	• Characteristics of parabolas
	    ○ Axis of symmetry
	    ○ Vertex (max/min)
	    ○ Intercepts
	    ○ Direction of opening
	• Graph parabolas
	    ○ From standard form
	    ○ From general form using vertex $\left(-\dfrac{b}{2a}, f\left(-\dfrac{b}{2a}\right)\right)$
	• Determine a quadratic function's minimum or maximum value
	• Use this information to solve real world problems

Section	Objectives
Polynomials	- Identify polynomial functions - Recognize characteristics - End behavior - Turning points - Multiplicity of zeros - X-intercepts - Sketch graphs of polynomials based off of characteristics
Dividing Polynomials; Remainder and Factor Theorems	- Use long division to divide polynomials - Use synthetic division to divide polynomials and find zeros - Evaluate a polynomial using the remainder theorem - Use division and the factor theorem to solve a polynomial - Use the linear factorization theorem to find polynomials with given zeros - Conjugate pair theorem
Rational Functions	- Vertical asymptotes - Horizontal asymptotes - Slant asymptotes - Sketching rational functions
Polynomial and Rational Inequalities	- Strategy - Set equal to zero - Solve corresponding equation - Draw number line and sketch graph or choose test points

UNIT 3

Section	Objectives
Exponentials	- Evaluate exponential functions - Graph exponential functions - Definition of e - Use compound interest formulas
Logarithmic Functions	- Change from logarithmic to exponential form and vice versa - Evaluate logarithms (without calculators) - Use basic logarithmic properties - Involving one - Inverse properties - Graphing - Use graph of n^x to graph $\log_n(x)$ - Identify domain of logarithms - Natural logarithms and their properties
Properties of Logarithms	- Product - Quotient - Power - Expand logarithmic expressions - Condense logarithmic expressions - Change-of-base

Exponential and Logarithmic Equations	• Use like bases to solve exponential equations • Use logarithms to solve exponential equations (tie to change of base formula) • Use the definition of a logarithm to solve logarithmic equations • Use the one-to-one property of logarithms to solve
Exponential Growth and Decay	• Population growth • Continuously compounding interest • Radioactive Decay

END OF TERM

Systems of Linear Equations	• Consistent, inconsistent, dependent • Substitution method • Addition (elimination) method • Solve problems