Math 260S: Precalculus with Supports

1. COURSE CONTENT AND OBJECTIVES:

COURSE CONTENT AND SCOPE - **Lecture:** Outline the topics included in the lecture portion of the course *(Outline reflects course description, all topics covered in class).*	Hours per topic	COURSE OBJECTIVES - **Lecture:** Upon successful completion of this course, the student will be able to..*(Use action verbs - see Bloom's Taxonomy for 'action verbs requiring cognitive outcomes.')*
Polynomial and rational functions: Quadratic functions, polynomial functions, dividing polynomials, real zeros of polynomials, complex numbers, complex zeros, the fundamental theorem of algebra, and rational functions.	15	Graph quadratic functions using the standard form. Find the maximum and minimum values of a quadratic function and model with quadratic functions. Â Graph basic polynomial functions. Determine the end behavior of a polynomial by considering the leading term. Use zeros to graph polynomials. Determine the shape of a graph near a zero. Find local maxima and minima of polynomials. Perform long division of polynomials, use synthetic division to evaluate a polynomial. Apply the Remainder and the Factor Theorems to polynomials. Find the rational zeros of a polynomial. Apply Descartes' Rule of Signs and find the upper and lower bounds for zeros of polynomials. Â Apply arithmetic operations on complex numbers. Find square roots of negative numbers. Determine all complex solutions of quadratic equations. Apply the Fundamental Theorem of Algebra to find the complete factorization of a polynomial. Â Find zeros of polynomials and their multiplicities. Know that for real polynomials complex zeros come in conjugate pairs. Find all linear and quadratic factors of a polynomial. Â Find all asymptotes of rational functions. Graph rational functions.
Exponential and logarithmic functions: Exponential functions, the natural exponential function,Â logarithmic functions,Â laws of logarithms,Â exponential and logarithmic equations, andÂ modeling with exponential and logarithmic functions.	15	Draw graphs of exponential functions and logarithmic functions. Compute simple compound interest and continuously compounded interest. Apply the change of base formula. Solve exponential and logarithmic equations. Model with exponential growth and radioactive decay. Apply Newton's Law of Cooling and work with logarithmic scales.
Systems of equations and inequalities:Â Systems of linear equations in two variables,Â systems of linear equations in several variables,Â matrices and systems of linear equations,Â the algebra of	15	Solve systems of equations by the substitution method, by the elimination method, and by graphical methods. Solve basic word problems with systems

matrices,Â inverses of matrices and matrix equations,Â determinants and Cramer's Rule,Â partial fractions,Â systems of nonlinear equations, andÂ systems of inequalities.		of equations. Â Work with matrices to solve a linear system. Solve a linear system by Gaussian elimination and by Gauss-Jordan elimination. Determine whether a linear system is inconsistent or dependent. Â Perform the basic operations of addition, subtraction, and scalar multiplication of matrices. Apply matrix multiplication to word problems. Find the inverse of a non-singular matrix, solve matrix equations, and model with matrix equations. Â Compute the determinant of a square matrix by expanding along a row or a column. Solve square linear systems by Cramer's Rule. Find the area of a triangle by determinants. Â Find the partial fraction decomposition of a rational function when the denominator has distinct linear factors, when the denominator has repeated linear factors, when the denominator has irreducible factors, and when the denominator has repeated irreducible factors. Â Solve simple nonlinear systems by substitution and/or by elimination or by graphical methods, graph inequalities, solve systems of inequalities, and apply these methods to linear systems in feasible regions.
Conic sections:Â Parabolas,Â ellipses,Â hyperbolas, shifted conics, rotation of axes, and polar equations of conics.	15	Give the geometric definition of a parabola, ellipse, and hyperbola. Find the equation and draw the graph of a parabola, ellipse, and hyperbola. Draw the graphs and give the equations of shifted conics. Use parabolas in applications. Find the eccentricity of an ellipse. Â Give the general equation of a conic. Rotate axes to eliminate the xy term in a conic. Use the discriminant to identify a conic. Give a unified geometric description of conics. Give the polar equations of conics.
Sequences and series: Sequences and summation notation, arithmetic sequences, geometric sequences, mathematics of finance, mathematical induction, and the Binomial Theorem.	15	Define a sequence by formula or recursively, find the partial sums of a sequence, and use sigma notation. Â Determine whether a sequence is arithmetic or geometric. Find the partial sums of an arithmetic or geometric sequence. Define what is meant by an infinite series and find the sum of an

		infinite geometric series. Â Calculate the amount of an annuity and give the present value of an annuity. Find the monthly payment of an installment purchase. Â Define the Principle of Mathematical Induction and prove a simple conjecture by mathematical induction. Â Expand (a+b)^n and give its binomial coefficients. Prove the Binomial Theorem by using mathematical induction.
Limits: Finding limits numerically, finding limits graphically, tangent lines and derivatives, limits at infinity, limits of sequences, and areas.	13	Give the definition of a limit and estimate limits numerically and graphically. Determine whether a limit fails to exist and describe one-sided limits. Apply the limit laws and algebra to find limits, including left- and right-hand limits. Â Define tangent lines, derivatives, and instantaneous rates of change. Use the concept of limit to find the slopes of tangents, instantaneous rates of change, and the derivative of a function. Â Give limits at infinity of a function and give the definition of the limit of a sequence. Â Describe the area problem and give the definition of area.
Final examination.	2	Final examination.
Total:	90	
Total Hrs In Protocol:	90	

1. LAB:

COURSE CONTENT AND SCOPE - **Lab:** Outline the topics included in the laboratory portion of the course *(Outline reflects course description, all topics covered in class).*	Hours per topic	COURSE OBJECTIVES - **Lab:** Upon successful completion of this course, the student will be able to..*(Use action verbs - see Bloom's Taxonomy for 'action verbs requiring cognitive outcomes.')*
Simplifying quadratic expressions and/or solving quadratic equations by factoring, grouping, quadratic formula, and completing the square.	3	Review quadratic expressions and/or solving equations by factoring, quadratic formula, and completing the square.
Simplifying and solving rational expressions/equations respectively.	2	Review of solving rational equations.
Graphs of functions of the type: f(x) = ax + b, f(x) = ax2 + bx + c, f(x) = |x|, f(x) = square root of x, and some basic shifts.	1	Review of graphing basic functions.
Domain and range of linear, quadratic, polynomial and rational functions. Long division of polynomials.	1	Review of domain and range.
Laws of Exponents including fractional powers.	2	Review Laws of Exponents.
Inequalities: Simple, compound, rational, quadratic, and absolute value.	3	Review of inequalities.
Solving systems of equations with two or three unknowns for a unique solution.	1	Review solving systems of equations.
Solving equations: Quadratic Type, Absolute Value, fractional powers and radical.	3	Review solving Quadratic Type, Absolute Value, fractional powers and radical.
Word problems of three types: Speed/distance, rate of work and mixture.	2	Review solving word problems.
Total:	18	
Total Hrs In Protocol:	18	