Math 125S: Intermediate Algebra with Support

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.')*
Review of expressions. Review of solving linear equations. Review of graphing linear equations. Review of polynomials. Review of factoring.	7	Evaluate an expression. Apply the distributive property. Combine like terms. Verify solutions to equations. Solve linear equations using the addition principle. Solve linear equations using the multiplication principle. Solve equations using both the addition and multiplication principles. Plot points in the coordinate plane. Find solutions for equations in two unknowns. Graph linear equations by plotting solutions. Graph linear equations using intercepts. Graph vertical and horizontal lines. Add and subtract polynomials. Multiply polynomials. Divide polynomials. Write a polynomial as a product of a monomial greatest common factor (GCF) and a polynomial. Factor by grouping. Factor trinomials of the form x^2 + bx + c. Factor trinomials of the form ax^2 + bx + c, where a is not equal to 1. Factor special products.
Arithmetic sequences and series. Geometric sequences and series. Binomial theorem.	8	Find the terms of a sequence when given the general term. Define and write arithmetic sequences, find their common difference, and find a particular term. Define and write series, find partial sums, and use summation notation. Write arithmetic series and find their sums. Write a geometric sequence and find its common ratio and a specified term. Find partial sums of geometric series. Find the sums of infinite geometric series. Solve applications using geometric series. Expand a binomial using Pascal's triangle. Evaluate factorial notation and binomial coefficients. Expand a binomial using the binomial theorem. Find a particular term of a binomial expansion.
Conic sections: The parabola and the circle.	8	Graph parabolas of the form x = a(y-k)^2 + h. Find the distance between two points. Graph circles of the form (x-h)^2 + (y-k)^2 = r^2. Find the equation of a circle with a given center and radius. Graph circles of the form x^2 + y^2 + dx + ey + f = 0. Graph ellipses and hyperbolas. Solve nonlinear systems of equations using

Ellipses and hyperbolas. Nonlinear systems of equations.		substitution. Solve nonlinear systems of equations using elimination. Graph nonlinear inequalities. Graph the solution set of a system of nonlinear inequalities.
Exponential and logarithmic functions. Composite and inverse functions. Exponential functions. Logarithmic functions. Properties of logarithms. Common and natural logarithms. Exponential and logarithmic equations with applications.	11	Find the composition of two functions. Show that two functions are inverses. Show that a function is one-to-one. Find the inverse of a function. Graph a given function's inverse function. Define and graph exponential functions. Solve equations of the form b^x = b^a for x. Use exponential functions to solve application problems. Convert between exponential and logarithmic forms. Solve logarithmic equations by changing to exponential form. Graph logarithmic functions. Solve applications involving logarithms. Apply the inverse property of logarithms. Apply the product, quotient, and power properties of logarithms. Define common logarithms and evaluate them using a calculator. Solve applications using common logarithms. Define natural logarithms and evaluate them using a calculator. Solve applications using natural logarithms. Solve equations that have variables as exponents. Solve equations containing logarithms. Solve applications involving exponential and logarithmic functions. Use the change-of-base formula.
Quadratic functions and equations. Completing the square. Solving quadratic equations using the quadratic formula. Solving equations that are quadratic in form. Graphing quadratic equations.	13	Use the square root principle to solve quadratic equations. Solve quadratic equations by completing the square. Solve quadratic equations using the quadratic formula. Use the discriminant to determine the number of real solutions that a quadratic equation will have. Find the x- and y- intercepts of a quadratic function. Solve applications using the quadratic formula. Solve equations by rewriting them in quadratic form. Solve equations that are quadratic in form by using substitution. Solve applications problems using equations that are quadratic in form. Graph quadratic functions of the form f(x) = ax^2. Graph quadratic functions of the form f(x) = ax^2 + k. Graph quadratic functions of the form f(x) = a(x-h)^2. Graph quadratic functions of the form f(x) = a(x-h)^2 + k. Graph quadratic functions of the form f(x) = ax^2 + bx + c. Solve applications involving parabolas. Solve quadratic and other inequalities. Solve rational inequalities.

Solving nonlinear inequalities.		
Exponents, radicals, radical expressions and functions. Rational exponents. Multiplying, dividing, and simplifying radicals. Adding, subtracting, and multiplying radical expressions. Rationalizing numerators and denominators of radical expressions. Radical equations and problem solving. Complex numbers.	12	Find the nth root of a number. Approximate roots using a calculator. Simplify radical expressions. Evaluate radical functions. Find the domain of radical functions. Solve applications involving radical functions. Evaluate rational exponents. Write radicals as expressions raised to rational exponents. Simplify expressions with rational number exponents using the rules of exponents. Use rational exponents to simplify radical expressions. Multiply and divide radical expressions. Use the product rule to simplify radical expressions. Add or subtract like radicals. Use the distributive property in expressions containing radicals. Simplify radical expressions that contain mixed operations. Rationalize denominators. Rationalize denominators that have a sum or difference with a square root term. Rationalize numerators. Use the power rule to solve radical equations. Write imaginary numbers using i. Perform arithmetic operations with complex numbers. Raise i to powers.
Inequalities and problem solving: Inequalities, equations, and absolute value. Solving systems of linear inequalities.	9	Solve compound inequalities involving 'and.' Solve compound inequalities involving 'or.' Solve equations involving absolute value. Solve absolute value inequalities involving less than. Solve absolute value inequalities involving greater than. Graph the solution set of a system of linear inequalities. Solve applications involving a system of linear inequalities.
Systems of linear equations and problem solving. Review of solving systems of linear equations in two variables graphically.	11	Determine if an ordered pair is a solution for a system of equations. Solve a system of linear equations graphically. Classify systems of linear equations in two unknowns. Solve systems of linear equations using substitution. Solve applications involving two unknowns using a system of equations. Solve systems of linear equations using

Review of solving systems of linear equations in two variables by substitution. Review of solving systems of linear equations in two variables by elimination. Solving systems of linear equations in three variables. Solving systems of linear equations using matrices or Cramer's Rule.		elimination. Solve applications using elimination. Determine if an ordered triple is a solution for a system of equations. Understand the graphs of systems of three equations. Solve a system of three linear equations using the elimination method. Solve applications involving three unknowns using a system of equations. Write a system of equations as an augmented matrix. Solve a system of linear equations by transforming its augmented matrix to echelon form. Evaluate determinants of 2 x 2 matrices. Evaluate determinants of 3 x 3 matrices. Solve systems of equations using Cramer's Rule.
Functions and graphs. Introduction to functions, function notation, and function operations.	9	Identify the domain and range of a relation and determine if the relation is a function. Identify functions and their domain and range. Find the value of a function. Graph linear functions. Add or subtract functions, multiply functions, and divide functions.
Final examination.	2	Final examination.
Total: Total Lecture Hours In Section I Class Hours:	90 90	

*Total lecture and laboratory hours (which include the final examination) must equal totals on page 1.
**In general "activity" courses or portions of courses are classified "laboratory."

1. LAB:

COURSE CONTENT AND SCOPE - **Lab:** 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 – **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.')*
Foundations of algebra: Number sets and the structure of algebra, fractions, and adding and subtracting real numbers. Properties of real numbers, multiplying and dividing real numbers, exponents, roots, and order of operations. Translating word phrases to expressions and evaluating and rewriting expressions.	3	Understand the foundations of algebra, apply the basic operations of arithmetic to real numbers using the order of operations, translate word phrases into expressions, evaluate, and rewrite expressions.
Solving linear equations and inequalities: Equations, formulas, and the problem-solving process. The addition principle, the multiplication principle, and applying the principles to formulas. Translating word sentences to equations and solving linear inequalities.	4	Solve linear equations and inequalities using the addition and multiplication principles, apply those principles to formulas, translate word sentences to equations.
Problem solving: Ratios and proportions, percents, problems with two or more unknowns, rates, investment, and mixture.	3	Solve problems involving ratios and proportions, percents, two unknowns, rates, investments, or mixtures.
Graphing linear equations and inequalities: The rectangular coordinate system, graphing linear equations, graphing using intercepts, slope-intercept form, point-slope form, and graphing linear inequalities.	5	Graph linear equations and inequalities, understand the rectangular coordinate system, graph linear equations using intercepts, graph linear equations given in slope-intercept form, graph linear equations given in point-slope form, graph linear inequalities.
Systems of equations in two variables: Solving systems of linear equations graphically, solving systems of linear equations by substitution, and solving systems of linear equations by elimination.	4	Solve systems of equations in two variables graphically, by the substitution method, or by the elimination method.
Polynomials: Exponents and scientific notation, introduction to polynomials, adding and subtracting polynomials, exponent rules and multiplying monomials, multiplying polynomials. Special products, exponent rules, and dividing polynomials.	5	Understand exponents and scientific notation, understand what a polynomial is, add, subtract, multiply and divide polynomials, recognize special products.
Factoring: Greatest common factor and factoring by grouping. Factoring trinomials of the form x^2 +bx+c, factoring trinomials of the form ax^2+bx+c, where a is not 1, factoring special products, strategies for factoring, solving quadratic equations by factoring, radical expressions, simplifying radicals, and solving quadratic equations using the quadratic formula.	6	Find the greatest common factor, factor by grouping, factor trinomials, factor special products, learn strategies for factoring, solve quadratic equations by factoring, work with radical expressions, solve quadratic equations using the quadratic formula.
Rational expressions and equations: Simplifying rational expressions, multiplying and dividing rational expressions, adding and subtracting rational expressions with the same denominator, adding and subtracting rational expressions with different denominators, complex rational expressions, solving equations containing rational expressions, and applications with rational expressions.	6	Simplify rational expressions, multiply, divide, add and subtract rational expressions, simplify complex rational expressions, solve equations involving rational expressions, use rational expressions in applications.
Total: Total Lab Hours In Section I Class Hours:	36 36	