Developmental Math Course Outcomes and Objectives

I. Math 0910 Basic Arithmetic/Pre-Algebra
Upon satisfactory completion of this course, the student should be able to perform the following outcomes and supporting objectives:

A. Add, subtract, multiply and divide whole numbers and solve application problems using whole numbers.
B. Add, subtract, multiply and divide fractions and solve applications problems using fractions.
C. Add, subtract, multiply and divide decimals and solve application problems using decimals.
D. Demonstrate an understanding of ratio and proportion and their applications.
E. Demonstrate an understanding of percents and solve percent application problems.
F. Use the English system and the Metric system to measure length, mass, and capacity.
G. Demonstrate an understanding of and use the order of operations.
H. Evaluate a variable expression given the values for the variables.
I. Simplify a variable expression by collecting like terms.
J. Solve simple linear equations.
K. Estimate a “reasonable” answer to an application problem.
L. Display several standard problem-solving techniques.
M. Demonstrate an understanding of the study skills necessary for success in mathematics courses.

II. Math 0950 Beginning Algebra I
Upon satisfactory completion of Math 0950 – Beginning Algebra I, the student should be able to perform the following outcomes and supporting objectives:

A. Apply knowledge of real numbers, their operations and basic properties.
B. Solve linear equations and linear inequalities with one variable.
C. Identify components of the rectangular coordinate system, determine the equations of lines and graph lines.
D. Solve systems of linear equations in two variables.

III. Math 0960 Beginning Algebra II
Upon satisfactory completion of MATH 0960 - Beginning Algebra II, the student should be able to perform the following outcomes and supporting objectives:

A. Simplify, evaluate, and perform basic operations on polynomials and exponential expressions.
   1. Define polynomial, standard form, degree, coefficient, monomial, binomial, trinomial, and degree of polynomial in one variable.
2. Perform addition and subtraction with polynomials in one or more variables.
3. Multiply monomial expressions.
4. Use the product rule for exponents.
5. Use the power rule for exponents.
6. Use the products-to-powers rule for exponents.
7. Multiply a monomial and a polynomial.
8. Multiply two polynomials when neither is a monomial.
9. Use special-product formulas to multiply binomials with one or more variables.
10. Determine the product of two general binomials.
11. Determine the product of conjugate binomials.
12. Determine the square of a binomial sum.
13. Determine the square of a binomial difference.
14. Evaluate polynomials in several variables given values for each variable.
15. Divide monomial expressions.
16. Use the quotient rule for exponents.
17. Use the zero-exponent rule.
18. Use the quotients-to-powers rule.
19. Use the negative exponent rule.
20. Divide polynomials by a monomial.
21. Simplify expressions with exponents involving multiple properties of exponents.
22. Perform conversion from scientific notation to decimal notation.
23. Perform conversion from decimal notation to scientific notation.
24. Use properties of exponents to perform computations with numbers in scientific notation.
25. Solve applications using scientific notation.

B. Factor polynomials and solve equations by factoring.
   1. Factor the greatest common factor (GCF) from polynomial.
   2. Factor four termed polynomials using the method of GCF.
   3. Factor perfect square trinomials.
   4. Factor the difference of two perfect squares.
   5. Factor trinomials with leading coefficient of one.
   6. Factor trinomials with leading coefficients not equal to one.
   7. Factor the sum and difference of two perfect cubes.
   8. Factor four termed polynomials using the difference of squares method.
   9. Factor four termed polynomials involving the difference of squares with a sum or difference of cubes.
   10. Identify prime polynomials.
   11. Write polynomial equations in standard form.
   12. Solve polynomial equations by factoring.
   13. Solve applications involving factoring.

C. Simplify rational expressions and solve rational equations.
   1. Define and recognize rational expressions.
   2. Determine the values for variables for which the rational expressions are undefined.
   3. Evaluate rational expressions at given numerical values.
   4. Simplify rational expressions into lowest terms.
5. Determine the least common denominator for rational expressions.
6. Rewrite rational expressions to have a common denominator.
7. Perform algebraic operations on rational expressions.
8. Define and simplify complex rational expressions.
9. Solve equations involving rational expressions.
10. Solve applications involving rational equations.

1250 Course Outcomes & Objectives

Upon satisfactory completion of this course, the student should be able to perform the following outcomes and supporting objectives:

A. Demonstrate the capacity to engage in logical thinking
B. Critically read technical information.
C. Exercise sound judgment in making personal and social decisions.
D. Demonstrate an appreciation for the power of mathematics.
E. Create mathematical models for a variety of problems.
F. Use analytic and quantitative means to solve problems using mathematical models.
G. Find the best methods for solving real-life problems.
H. Create linear programming models for business/management problems.
I. Use geometric means to find the optimal solution for business/management problems.
J. Demonstrate the ability to produce and interpret data and draw conclusions about the world around us.
K. Demonstrate the ability to determine simple probabilities and solve related problems.
L. Demonstrate an understanding of the role of mathematics in measuring and predicting growth in:
   1. the study of finance
   2. the biological sciences
   3. population
M. Demonstrate an appreciation for the role of mathematics in individual and societal choices.
N. Use the calculator/computer as a tool in computation and problem solving.

1270 Course Outcomes and Objectives

Upon satisfactory completion of MATH 1270 - Intermediate Algebra, the student should be able to perform the following outcomes and supporting objectives:

Outcome: Solve systems of linear equations in three variables.

Supporting Objectives:

A. Verify solutions of systems of linear equations in three variables.
B. Identify consistent, inconsistent, and dependent systems in three variables and learn to write the solutions for each type.
C. Discuss visually what the solutions to linear equations in three variables look like in terms of planes in three-dimensional space.
D. Solve systems of linear equations in three variables using the Elimination Method.
E. Use systems of linear equations in three variables to model application problems and then solve those systems using the Elimination Method.
Outcome: Define, evaluate and perform operations on functions.

Supporting Objectives:

A. Define relation, domain, range, function, and inverse function.
B. Identify the domain and range of a relation and determine whether a relation is a function.
C. Identify the domain and range of a relation and determine whether a relation is a function.
D. Evaluate functions algebraically and graphically.
E. Identify the domain and range of a function from its graph and the domain of a function algebraically.
F. Use the vertical line test to identify functions.
G. Perform operations (sum, difference, product, and quotient) on functions and determine their new domain.
H. Form composite functions and find their domain.
I. Find inverse functions algebraically.
J. Use the horizontal line test to determine if a function has an inverse function.
K. Graph inverse functions given the graph of a one-to-one function.

Outcome: Solve, simplify, and graph linear Inequalities in two variables.

Supporting Objectives:

A. Find the intersection and union of two sets.
B. Solve compound inequalities involving “and” & “or” and express solutions in interval notation, in set-builder notation and by graphing on a number line.
C. Graph linear inequalities in two variables.
D. Graph systems of linear inequalities.
E. Use compound inequalities and linear inequalities to solve application problems.

Outcome: Rewrite and solve equations dealing with radical expressions.

Supporting Objectives:

A. Define square root, cube root, nth root, principal root, conjugate, and non real roots.
B. Evaluate radical expressions (square root, cube root, and higher roots) and radical functions.
C. Use a calculator to approximate irrational radical expressions.
D. Find the domain of radical functions.
E. Simplify radical expressions involving the nth root of a and where a is any real number and n can be an even or odd natural number.
F. Simplify exponential expressions and radical expressions using rational exponents.
G. Define and apply the properties need to multiply, divide, add, subtract, and simplify radical expressions.
H. Multiply radical expressions with more than one term and using polynomial special products.
I. Rationalize denominators containing one radical term including square roots, cube roots, and higher roots.
J. Rationalize denominators containing two terms including one or more square roots.
K. Solve radical equations with one and two radical terms and with rational exponents resulting in real solutions.
L. Identify radical equations that have no solutions or extraneous solutions.
M. Solve application problems involving radical equations and radical functions.

Outcome: Solve quadratic equations and graph quadratic functions.

Supporting Objectives:

A. Define quadratic functions and equations.
B. Use the four ways to solve a quadratic equations including Zero-Product Property, Square Root Property, Completing the Square, and the Quadratic Formula and discuss when to use the methods.
C. Use the discriminant to find the number and types of solutions to quadratic equations and to determine when expressions of the form $ax^2 + bx + c > 0$ factor using rational numbers.
D. Write quadratic equations from given solutions.
E. Graph quadratic functions and find intercepts, vertex, axis of symmetry, and range using the $f(x)=ax^2 + bx + c$ and $f(x)=a(x-h)^2 + k$ forms.
F. Maximize or minimize quadratic functions using the vertex.
G. Solve equations quadratic in form.
H. Find real and complex solutions to quadratic equations and equations quadratic in form.
I. Find solutions to polynomial and rational inequalities.
J. Model applications related to polynomial and rational inequalities.

Outcome: Simplify expressions and solve equations involving exponential and logarithmic expressions.

Supporting Objectives:

A. Define and graph exponential and logarithmic functions.
B. Determine the domain and ranges of exponential and logarithmic functions.
C. Identify properties of logarithmic functions including the Product, Quotient, Power, and Change of Base Rules and use the properties to rewrite logarithmic functions.
D. Define and evaluate common and natural logarithms.
E. Write exponential equations as logarithmic equations and logarithmic equations as exponential equations using the definition of a logarithm: \( ay = x \) if and only if \( \log ax = y \).

F. Use the one-to-one property of exponential functions to solve one-to-one exponential equations.

G. Use the one-to-one property of logarithmic functions to solve one-to-one logarithmic equations.

H. Use the inverse relationship between the exponential function and logarithmic function to solve exponential and logarithmic equations.

I. Evaluate applications involving exponential and logarithmic functions and equations including exponential growth and decay and periodic and continuous compounding.

**1141 Course Outcomes & Objectives**

Upon satisfactory completion of this course, the student should be able to perform the following outcomes and supporting objectives:

A. Demonstrate decision making skills to solve applications from a variety of disciplines with an emphasis on health careers.

B. Apply dimensional analysis and proportions to perform unit conversions.

C. Demonstrate an understanding of the metric system and how this system relates to the US Customary System of Measurement.

D. Interpret and analyze mathematical models, and decide on appropriate techniques and methods to obtain solution(s).

E. Determine whether solutions are reasonable and appropriate to the application.

F. Manipulate and solve equations generated by the mathematical models related to a variety of disciplines.

G. Create and interpret graphs.

H. Demonstrate a working understanding of functions.

I. Evaluate and manipulate formulas.

J. Use technology to assist in problem solving.