

ALEKS[®] Course Syllabus

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| Course Name: Math 1050 Spring 14 – 006 | Course Code: RUXP9-ULEE9 |
| ALEKS Course: College Algebra | Instructor: Inst. Lindsay |
| Course Dates: Begin: 01/01/2014 End: 05/03/2014 | Course Content: 378 topics |
| Textbook: Coburn: College Algebra, 2nd Ed. (McGraw-Hill) - ALEKS 360 | |

| Dates Covered | Objective |
|---------------------|---|
| 01/01/14 - 01/13/14 | 1. Ch.R-A Review of Basic Concepts and Skills |
| 01/14/14 - 01/27/14 | 2. Ch.1-Equations and Inequalities |
| 01/28/14 - 02/11/14 | 3. Ch.2-Relations, Functions and Graphs |
| 02/12/14 - 02/25/14 | 4. Ch.3-Polynomial and Rational Functions |
| 02/26/14 - 03/07/14 | 5. Ch.4-Exponential and Logarithmic Functions |
| 03/08/14 - 03/17/14 | 6. Ch.5-Systems of Equations and Inequalities |
| 03/18/14 - 04/01/14 | 7. Ch.6-Matrices and Matrix Applications |
| 04/02/14 - 04/10/14 | 8. Ch.7-Analytic Geometry and Conic Sections |
| 04/11/14 - 04/22/14 | 9. Ch.8-Additional Topics in Algebra |

Ch.R-A Review of Basic Concepts and Skills (89 topics, due on 01/13/14)

- Identifying numbers as integers or non-integers
- Identifying numbers as rational or irrational
- Properties of real numbers
- Operations with absolute value
- Exponents and integers: Problem type 1
- Exponents and integers: Problem type 2
- Order of operations with integers and exponents
- Evaluating a linear expression: Integer multiplication with addition or subtraction
- Evaluating a quadratic expression: Integers
- Signed fraction addition or subtraction: Basic
- Signed fraction multiplication: Advanced
- Degree and leading coefficient of a univariate polynomial
- Combining like terms: Advanced
- Simplifying a sum or difference of two univariate polynomials
- Multiplying a univariate polynomial by a monomial with a positive coefficient
- Multiplying binomials with leading coefficients of 1
- Squaring a binomial: Univariate
- Multiplying conjugate binomials: Univariate
- Multiplying binomials in two variables
- Multiplication involving binomials and trinomials in two variables
- Factoring a quadratic with leading coefficient 1
- Factoring a quadratic with leading coefficient greater than 1
- Factoring a difference of squares

- Factoring with repeated use of the difference of squares formula
- Factoring a sum or difference of two cubes
- Factoring out a monomial from a polynomial: Univariate
- Factoring a product of a quadratic trinomial and a monomial
- Factoring a polynomial by grouping: Problem type 2
- Factoring out a binomial from a polynomial: Advanced
- Least common multiple of two monomials
- Adding rational expressions with common denominators and binomial numerators
- Adding rational expressions with multivariate monomial denominators: Advanced
- Adding rational expressions with different denominators: ax , bx
- Adding rational expressions with different denominators: $x+a$, $x+b$
- Adding rational expressions involving different quadratic denominators
- Simplifying a ratio of polynomials: Problem type 1
- Simplifying a ratio of polynomials: Problem type 2
- Multiplying rational expressions involving multivariate monomials
- Multiplying rational expressions involving quadratics with leading coefficients of 1
- Dividing rational expressions involving multivariate monomials
- Dividing rational expressions involving quadratics with leading coefficients of 1
- Complex fraction: GCF and quadratic factoring
- Complex fraction made of sums involving rational expressions
- Evaluating expressions with exponents of zero
- Evaluating numbers with negative exponents
- Introduction to the product rule of exponents
- Product rule with positive exponents: Multivariate
- Quotient of expressions involving exponents
- Quotient rule with negative exponents: Problem type 1
- Introduction to the power rules of exponents
- Power rules with positive exponents
- Power of a power rule with negative exponents
- Power rules with negative exponents
- Power and product rules with positive exponents
- Converting between decimal numbers and numbers written in scientific notation
- Cube root of an integer
- Simplifying the square root of a whole number less than 100
- Square root of a perfect square monomial
- Simplifying a radical expression with an even exponent
- Simplifying a radical expression with two variables
- Square root addition or subtraction
- Simplifying a sum or difference of radical expressions: Multivariate
- Square root multiplication: Advanced
- Simplifying a product of radical expressions: Multivariate
- Simplifying a product involving square roots using the distributive property: Advanced
- Special products of radical expressions: Conjugates and squaring
- Rationalizing the denominator of a radical expression
- Rationalizing the denominator of a radical expression using conjugates
- Simplifying a higher root of a whole number
- Simplifying a higher radical expression: Multivariate
- Rationalizing a denominator: Quotient involving higher radicals and monomials
- Rational exponents: Non-unit fraction exponent with a whole number base
- Rational exponents: Negative exponents and fractional bases
- Rational exponents: Products and quotients with negative exponents
- Rational exponents: Powers of powers with negative exponents
- Converting between radical form and exponent form
- Simplifying products or quotients of higher radicals with different indices: Multivariate
- Pythagorean Theorem
- Area of a triangle
- Circumference and area of a circle
- Area between two concentric circles
- Area involving rectangles and circles
- Volume of a rectangular prism
- Volume of a triangular prism
- Volume of a cylinder
- Rate of filling of a solid
- Volume of a sphere
- Surface area of a cube or a rectangular prism
- Indirect measurement

Ch.1-Equations and Inequalities (62 topics, due on 01/27/14)

- Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
- Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
- Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
- Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
- Solving equations with zero, one, or infinitely many solutions
- Solving an absolute value equation of the form $|ax| = b$ or $|x| + a = b$
- Solving an absolute value equation of the form $|ax + b| = c$
- Algebraic symbol manipulation: Problem type 1
- Algebraic symbol manipulation: Problem type 2
- Solving a word problem with two unknowns using a linear equation
- Solving a decimal word problem using a linear equation of the form $Ax + B = C$
- Finding the perimeter or area of a rectangle given one of these values
- Solving a value mixture problem using a linear equation
- Solving a percent mixture problem using a linear equation
- Solving a distance, rate, time problem using a linear equation
- Finding the value for a new score that will yield a given mean
- Solving a linear inequality: Problem type 2
- Solving a linear inequality: Problem type 3
- Solving a linear inequality: Problem type 4
- Solving a compound linear inequality: Problem type 1
- Solving an absolute value inequality: Basic
- Solving an absolute value inequality: Advanced
- Word problem with linear inequalities: Problem type 1
- Word problem with linear inequalities: Problem type 2
- Solving a rational equation that simplifies to linear: Denominator x
- Solving a rational equation that simplifies to linear: Denominator $x + a$
- Solving a rational equation that simplifies to linear: Unlike binomial denominators
- Solving a rational equation that simplifies to linear: Denominators a , x , or ax
- Word problem involving multiple rates
- Solving a work problem using a rational equation
- Solving a radical equation that simplifies to a linear equation: One radical, basic
- Solving a radical equation that simplifies to a quadratic equation: One radical
- Solving a radical equation that simplifies to a quadratic equation: Two radicals
- Solving an equation with a root index greater than 2
- Solving an equation with positive rational exponent
- Set builder and interval notation
- Union and intersection of finite sets
- Finding the roots of a quadratic equation with leading coefficient 1
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a quadratic equation needing simplification
- Solving a rational equation that simplifies to quadratic: Binomial denominators, constant numerators
- Solving a rational equation that simplifies to quadratic: Binomial denominators and numerators
- Solving a rational equation that simplifies to quadratic: Proportional form, advanced
- Solving an equation that can be written in quadratic form: Problem type 1
- Solving an equation that can be written in quadratic form: Problem type 2
- Solving a quadratic equation using the square root property: Problem type 1
- Solving a quadratic equation using the square root property: Problem type 2
- Completing the square
- Solving a quadratic equation by completing the square
- Applying the quadratic formula: Exact answers
- Discriminant of a quadratic equation
- Discriminant of a quadratic equation with parameter
- Solving a word problem using a quadratic equation with rational roots
- Solving a word problem using a quadratic equation with irrational roots
- Solving an equation written in factored form
- Using i to rewrite square roots of negative numbers
- Simplifying a product and quotient involving square roots of negative numbers
- Adding or subtracting complex numbers
- Multiplying complex numbers
- Dividing complex numbers
- Simplifying a power of i
- Solving a quadratic equation with complex roots

Ch.2-Relations, Functions and Graphs (65 topics, due on 02/11/14)

- Plotting a point in the coordinate plane
- Solving a decimal word problem using a linear equation of the form $Ax + B = C$
- Identifying functions from relations
- Vertical line test
- Evaluating functions: Linear and quadratic or cubic
- Evaluating functions: Absolute value, rational, radical
- Evaluating a piecewise-defined function
- Variable expressions as inputs of functions
- Domain and range from ordered pairs
- Domain of a square root function: Advanced
- Domain of a rational function
- Finding the domain of a fractional function involving radicals
- Finding a difference quotient for a function
- Finding the average rate of change of a function
- Graphing a line given its equation in slope-intercept form
- Graphing a line given its equation in standard form
- Graphing a line through a given point with a given slope
- Graphing a vertical or horizontal line
- Finding x- and y-intercepts of a line given the equation: Advanced
- Finding slope given the graph of a line on a grid
- Finding slope given two points on the line
- Finding the slope of a line given its equation
- Writing an equation of a line given the y-intercept and another point
- Writing the equation of a line given the slope and a point on the line
- Writing the equation of the line through two given points
- Writing the equations of vertical and horizontal lines through a given point
- Interpreting the graphs of two functions
- Application problem with a linear function: Finding a coordinate given the slope and a point
- Application problem with a linear function: Finding a coordinate given two points
- Finding slopes of lines parallel and perpendicular to a line given in the form $Ax + By = C$
- Writing equations of lines parallel and perpendicular to a given line through a point
- Finding inputs and outputs of a function from its graph
- Finding intercepts of a nonlinear function given its graph
- Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
- Finding local maxima and minima of a function given the graph
- Domain and range from the graph of a continuous function
- Even and odd functions
- Writing an equation for a function after a vertical translation
- Writing an equation for a function after a vertical and horizontal translation
- Translating the graph of a function: One step
- Translating the graph of a function: Two steps
- Transforming the graph of a function by reflecting over an axis
- Transforming the graph of a function by shrinking or stretching
- Transforming the graph of a function using more than one transformation
- Graphing a parabola of the form $y = ax^2$
- Graphing a cubic function of the form $y = ax^3$
- Graphing a square root function
- Graphing an absolute value equation in the plane: Advanced
- Graphing a piecewise-defined function
- Choosing a graph to fit a narrative : Advanced
- Sum, difference, and product of two functions
- Quotient of two functions
- Combining functions: Advanced
- Composition of two functions: Basic
- Composition of two functions: Advanced
- Expressing a function as a composition of two functions
- Graphing a parabola of the form $y = (x-a)^2 + c$
- Classifying the graph of a function
- How the leading coefficient affects the shape of a parabola
- Midpoint of a line segment in the plane
- Distance between two points in the plane
- Graphing a circle given its equation in standard form
- Graphing a circle given its equation in general form
- Writing an equation of a circle given its center and a point on the circle
- Writing an equation of a circle given the endpoints of a diameter

Ch.3-Polynomial and Rational Functions (51 topics, due on 02/25/14)

- Writing an equation that models variation
- Word problem on direct variation
- Word problem on inverse variation
- Word problem on combined variation
- Solving a word problem using a quadratic equation with irrational roots
- Finding the maximum or minimum of a quadratic function
- Word problem involving the maximum or minimum of a quadratic function
- Finding the x-intercept(s) and the vertex of a parabola
- Rewriting a quadratic function to find the vertex of its graph
- Using a graphing calculator to find the x-intercept(s) and vertex of a quadratic function
- Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
- Graphing a parabola of the form $y = ax^2 + bx + c$: Rational coefficients
- Writing the equation of a quadratic function given its graph
- Polynomial long division: Problem type 1
- Polynomial long division: Problem type 2
- Polynomial long division: Problem type 3
- Synthetic division
- Using the remainder theorem to evaluate a polynomial
- The Factor Theorem
- Finding zeros of a polynomial function written in factored form
- Finding a polynomial of a given degree with given zeros: Real zeros
- Using a given zero to write a polynomial as a product of linear factors: Real zeros
- Finding all possible rational zeros using the rational zeros theorem: Problem type 1
- Finding all possible rational zeros using the rational zeros theorem: Problem type 2
- Descartes' Rule of Signs
- Using the rational zeros theorem to find all zeros of a polynomial: Rational zeros
- Using the rational zeros theorem to find all zeros of a polynomial: Irrational zeros
- Using a graphing calculator to solve a word problem involving a polynomial of degree 3
- Multiplying expressions involving complex conjugates
- Finding a polynomial of a given degree with given zeros: Complex zeros
- Using a given zero to write a polynomial as a product of linear factors: Complex zeros
- Using the rational zeros theorem to find all zeros of a polynomial: Complex zeros
- Finding x- and y-intercepts given a polynomial function
- Determining the end behavior of the graph of a polynomial function
- Using a graphing calculator to find zeros of a polynomial function
- Using a graphing calculator to find local extrema of a polynomial function
- Inferring properties of a polynomial function from its graph
- Matching graphs with polynomial functions
- Using a graphing calculator to solve a word problem involving a local extremum of a polynomial function
- Finding the asymptotes of a rational function: Basic
- Finding the asymptotes of a rational function: Advanced
- Graphing a rational function: Problem type 1
- Graphing a rational function: Problem type 2
- Graphing rational functions with holes
- Matching graphs with rational functions: Two vertical asymptotes
- Writing the equation of a rational function given its graph
- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality
- Solving a polynomial inequality
- Solving a rational inequality: Problem type 1
- Solving a rational inequality: Problem type 2

Ch.4-Exponential and Logarithmic Functions (37 topics, due on 03/07/14)

- Finding simple interest without a calculator
- Horizontal line test
- Determining whether two functions are inverses of each other
- Inverse functions: Problem type 1
- Inverse functions: Problem type 2
- Inverse functions: Problem type 3
- Evaluating an exponential function that models a real-world situation
- Converting between logarithmic and exponential equations
- Converting between natural logarithmic and exponential equations
- Evaluating a logarithmic expression

- Basic properties of logarithms
- Writing an expression as a single logarithm
- Expanding a logarithmic expression: Problem type 1
- Expanding a logarithmic expression: Problem type 2
- Change of base for logarithms: Problem type 1
- Solving an equation of the form $\log_b a = c$
- Solving an equation involving logarithms on both sides: Problem type 1
- Solving a multi-step equation involving a single logarithm
- Solving a multi-step equation involving natural logarithms
- Solving an equation involving logarithms on both sides: Problem type 2
- Solving an exponential equation by using logarithms: Exact answers in logarithmic form
- Solving an exponential equation by finding common bases: Linear and quadratic exponents
- Solving exponential equations by using logarithms and natural logarithms: Decimal answers
- Solving an exponential equation by using substitution and quadratic factoring
- Using a graphing calculator to solve an exponential or logarithmic equation
- Finding a final amount in a word problem on exponential growth or decay
- Finding the time to reach a limit in a word problem on exponential growth or decay
- Finding the initial or final amount in a word problem on exponential growth or decay
- Finding the rate or time in a word problem on exponential growth or decay
- Compound interest
- Graphing an exponential function and its asymptote: $f(x) = a(b)^x$
- The graph, domain, and range of an exponential function
- Graphing an exponential function and its asymptote: $f(x) = a(e)^{x-b} + c$
- Graphing a logarithmic function: Basic
- The graph, domain, and range of a logarithmic function
- Domain of a logarithmic function: Advanced
- Translating the graph of a logarithmic or exponential function

Ch.5-Systems of Equations and Inequalities (25 topics, due on 03/17/14)

- Writing a multi-step inequality for a real-world situation
- Determining whether given points lie on one, both, or neither of 2 lines given equations
- Graphing a linear inequality in the plane: Standard form
- Graphing a linear inequality in the plane: Vertical or horizontal line
- Graphing a linear inequality in the plane: Slope-intercept form
- Graphing a quadratic inequality: Problem type 1
- Classifying systems of linear equations from graphs
- Graphically solving a system of linear equations
- Solving a system of linear equations using substitution
- Solving a system of linear equations using elimination with multiplication and addition
- Solving a system of linear equations that is inconsistent or consistent dependent
- Solving a system of 3 linear equations in 3 unknowns
- Solving a word problem involving a sum and another simple relationship using a system of linear equations
- Solving a value mixture problem using a system of linear equations
- Solving a distance, rate, time problem using a system of linear equations
- Solving a percent mixture problem using a system of linear equations
- Solving a tax rate or interest rate problem using a system of linear equations
- Solving a word problem using a 3x3 system of linear equations
- Graphing a system of two linear inequalities: Basic
- Solving a word problem using a system of linear inequalities
- Linear programming
- Solving a word problem using linear programming
- Solving a system of nonlinear equations
- Using a graphing calculator to solve a system of equations
- Graphing a system of nonlinear inequalities: Problem type 1

Ch.6-Matrices and Matrix Applications (17 topics, due on 04/01/14)

- Partial fraction decomposition with distinct linear factors
- Partial fraction decomposition with repeated linear factors
- Partial fraction decomposition with an irreducible quadratic factor
- Scalar multiplication of a matrix
- Addition or subtraction of matrices
- Linear combination of matrices
- Multiplication of matrices: Basic

- Multiplication of matrices: Advanced
- Finding the determinant of a 2x2 matrix
- Finding the determinant of a 3x3 matrix
- Finding the inverse of a 2x2 matrix
- Finding the inverse of a 3x3 matrix
- Using Cramer's rule to solve a 2x2 system of linear equations
- Using Cramer's rule to solve a 3x3 system of linear equations
- Using the inverse of a matrix to solve a system of linear equations
- Gauss-Jordan elimination with a 2x2 matrix
- Solving a system of linear equations given its augmented matrix

Ch.7-Analytic Geometry and Conic Sections (20 topics, due on 04/10/14)

- Graphing a parabola with a horizontal or a vertical axis
- Writing an equation of a parabola given the vertex and the focus
- Finding the focus of a parabola
- Graphing a circle given its equation in standard form
- Graphing a circle given its equation in general form
- Writing an equation of a circle given its center and a point on the circle
- Writing an equation of a circle given the endpoints of a diameter
- Graphing an ellipse centered at the origin: $Ax^2 + By^2 = C$
- Graphing an ellipse given its equation in standard form
- Graphing an ellipse given its equation in general form
- Finding the foci of an ellipse
- Writing an equation of an ellipse given the foci and the major axis length
- Writing an equation of an ellipse given the center, an endpoint of an axis, and the length of the other axis
- Graphing a hyperbola centered at the origin: $Ax^2 + By^2 - C = 0$
- Graphing a hyperbola given its equation in standard form
- Graphing a hyperbola given its equation in general form
- Finding the foci of a hyperbola
- Writing an equation of a hyperbola given the foci and the vertices
- Writing an equation of a hyperbola given the foci and the asymptotes
- Classifying conics given their equations

Ch.8-Additional Topics in Algebra (18 topics, due on 04/22/14)

- Finding the first terms of a sequence using an explicit rule with multiple occurrences of n
- Arithmetic and geometric sequences: Identifying and writing an explicit rule
- Finding a specified term of an arithmetic sequence given two terms of the sequence
- Finding a specified term of a geometric sequence given two terms of the sequence
- Sum of the first n terms of an arithmetic sequence
- Sum of the first n terms of a geometric sequence
- Sum of an infinite geometric series
- Factorial expressions
- Introduction to permutations and combinations
- Permutations and combinations: Problem type 1
- Permutations and combinations: Problem type 2
- Permutations and combinations: Problem type 3
- Binomial formula
- Probabilities of draws with replacement
- Probabilities of draws without replacement
- Outcomes and event probability
- Probabilities involving two dice
- Probability of intersection or union: Word problems