

# ALEKS<sup>®</sup> Course Syllabus

<b>Course Name:</b> Math 00023	<b>Course Code:</b> N/A
<b>ALEKS Course:</b> Intermediate Algebra	<b>Instructor:</b> Master Templates
<b>Course Dates:</b> Begin: 08/15/2014 End: 08/15/2015	<b>Course Content:</b> 245 topics
<b>Textbook:</b> Miller/O'Neill/Hyde: Intermediate Algebra, 4th Ed. (McGraw-Hill) - ALEKS 360	

## Chapter R - Review of Basic Algebraic Concepts (26 topics, no due date)

### Section R.2 (8 topics)

- Square root of a perfect square
- Identifying numbers as integers or non-integers
- Identifying numbers as rational or irrational
- Translating a sentence by using an inequality symbol
- Graphing a linear inequality on the number line
- Translating a sentence into a compound inequality
- Graphing a compound inequality on the number line
- Set builder and interval notation

### Section R.3 (11 topics\*)

- Square root of a perfect square
- Absolute value of a number
- Signed fraction multiplication: Advanced
- Exponents and integers: Problem type 1
- Exponents and integers: Problem type 2
- Exponents and signed fractions
- Order of operations with integers and exponents
- Perimeter of a square or a rectangle
- Area of a square or a rectangle
- Circumference and area of a circle
- Square root of a rational perfect square

### Section R.4 (4 topics)

- Properties of addition
- Using distribution and combining like terms to simplify: Univariate
- Using distribution with double negation and combining like terms to simplify: Multivariate
- Combining like terms in a quadratic expression

### Chapter R Supplementary Topics (4 topics)

- Signed fraction addition or subtraction: Advanced
- Signed decimal addition and subtraction with 3 numbers
- Operations with absolute value: Problem type 2
- Properties of real numbers

(\*) Some topics in this section are also covered in a previous section of this Objective.  
Topics are only counted once towards the total number of topics for this Objective.

## Chapter 1 - Linear Equations and Inequalities in One Variable (46 topics, no due date)

### Section 1.1 (9 topics)

- Multiplicative property of equality with signed fractions
- Additive property of equality with a negative coefficient
- Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution

- 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 two-step equation with signed fractions
- 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: Fractional forms with binomial numerators
- Solving equations with zero, one, or infinitely many solutions

*Section 1.2* (11 topics)

- Writing a one-step expression for a real-world situation
- Translating a phrase into a two-step expression
- Translating a sentence into a one-step equation
- Solving a word problem with two unknowns using a linear equation
- Solving a decimal word problem using a linear equation of the form  $Ax + B = C$
- Solving a value mixture problem using a linear equation
- Solving a distance, rate, time problem using a linear equation
- Finding the sale price without a calculator given the original price and percent discount
- Finding the original price given the sale price and percent discount
- Solving a percent mixture problem using a linear equation
- Finding simple interest without a calculator

*Section 1.3* (9 topics)

- Evaluating a quadratic expression: Integers
- Solving for a variable in terms of other variables using addition or subtraction: Advanced
- Solving for a variable in terms of other variables using multiplication or division: Advanced
- Solving for a variable in terms of other variables using addition or subtraction with division
- Solving for a variable inside parentheses in terms of other variables
- Solving for a variable in terms of other variables in a linear equation with fractions
- Finding the side length of a rectangle given its perimeter or area
- Finding a side length given the perimeter and side lengths with variables
- Finding the perimeter or area of a rectangle given one of these values

*Section 1.4* (5 topics)

- Additive property of inequality with integers
- Multiplicative property of inequality with integers
- Solving a two-step linear inequality: Problem type 1
- Solving a two-step linear inequality: Problem type 2
- Solving a linear inequality with multiple occurrences of the variable: Problem type 3

*Section 1.5* (3 topics)

- Graphing a compound inequality on the number line
- Solving a compound linear inequality: Graph solution, basic
- Solving a compound linear inequality: Interval notation

*Chapter 1 Supplementary Topics* (9 topics)

- Solving a fraction word problem using a linear equation of the form  $Ax = B$
- Solving a decimal word problem using a linear equation with the variable on both sides
- Solving a fraction word problem using a linear equation with the variable on both sides
- Solving a word problem with three unknowns using a linear equation
- Word problem on unit rates associated with ratios of whole numbers: Decimal answers
- Solving a word problem involving rates and time conversion
- Solving equations involving vertical angles
- Finding angle measures of a right or isosceles triangle given angles with variables
- Finding the percentage increase or decrease: Advanced

**Chapter 2 - Linear Equations in Two Variables and Functions** (32 topics, no due date)

*Section 2.1* (12 topics)

- Reading a point in the coordinate plane
- Plotting a point in the coordinate plane
- Identifying solutions to a linear equation in two variables
- Finding a solution to a linear equation in two variables
- Graphing a linear equation of the form  $y = mx$
- Graphing a line given its equation in slope-intercept form: Integer slope

- Graphing a line given its equation in slope-intercept form: Fractional slope
- Graphing a line given its equation in standard form
- Graphing a vertical or horizontal line
- Finding x- and y-intercepts of a line given the equation: Advanced
- Graphing a line given its x- and y-intercepts
- Graphing a line by first finding its x- and y-intercepts

*Section 2.2* (4 topics)

- Finding slope given the graph of a line on a grid
- Finding slope given two points on the line
- Finding the slope of horizontal and vertical lines
- Graphing a line through a given point with a given slope

*Section 2.3* (8 topics)

- Finding the slope and y-intercept of a line given its equation in the form  $Ax + By = C$
- Graphing a line by first finding its slope and y-intercept
- Writing an equation in slope-intercept form given the slope and a point
- Writing an equation of a line given the y-intercept and another point
- Writing the equation of the line through two given points
- Writing the equations of vertical and horizontal lines through a given point
- 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

*Section 2.5* (2 topics)

- Domain and range from ordered pairs
- Domain and range from the graph of a continuous function

*Section 2.6* (6 topics\*)

- Identifying functions from relations
- Vertical line test
- Table for a linear function
- Evaluating functions: Linear and quadratic or cubic
- Finding inputs and outputs of a function from its graph
- Domain and range from the graph of a continuous function

*Section 2.7* (1 topic)

- Classifying the graph of a function

(\*) Some topics in this section are also covered in a previous section of this Objective.  
Topics are only counted once towards the total number of topics for this Objective.

## **Chapter 3 - Systems of Linear Equations and Inequalities** (9 topics, no due date)

*Section 3.1* (3 topics)

- Identifying solutions to a system of linear equations
- Classifying systems of linear equations from graphs
- Graphically solving a system of linear equations

*Section 3.2* (1 topic)

- Solving a system of linear equations using substitution

*Section 3.3* (2 topics)

- Solving a system of linear equations using elimination with multiplication and addition
- Solving a 2x2 system of linear equations that is inconsistent or consistent dependent

*Section 3.4* (3 topics)

- Solving a word problem involving a sum and another basic 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

## **Chapter 4 - Polynomials** (59 topics, no due date)

*Section 4.1* (20 topics)

- Introduction to the product rule of exponents
- Product rule with positive exponents: Multivariate
- Introduction to the power of a power rule of exponents
- Introduction to the power of a product rule of exponents
- Power rules with positive exponents: Multivariate products
- Power rules with positive exponents: Multivariate quotients
- Power and product rules with positive exponents
- Quotient of expressions involving exponents
- Evaluating expressions with exponents of zero
- Evaluating an expression with a negative exponent: Positive fraction base
- Evaluating an expression with a negative exponent: Negative integer base
- Rewriting an algebraic expression without a negative exponent
- Product rule with negative exponents
- Quotient rule with negative exponents: Problem type 1
- Power of a power rule with negative exponents
- Power rules with negative exponents
- Power, product, and quotient rules with negative exponents
- Scientific notation with positive exponent
- Scientific notation with negative exponent
- Multiplying numbers written in scientific notation: Advanced

*Section 4.2* (3 topics)

- Evaluating a quadratic expression: Integers
- Degree and leading coefficient of a univariate polynomial
- Simplifying a sum or difference of three univariate polynomials

*Section 4.3* (8 topics\*)

- Product rule with positive exponents: Multivariate
- Multiplying a univariate polynomial by a monomial with a positive coefficient
- Multiplying a multivariate polynomial by a monomial
- Multiplying binomials with leading coefficients of 1
- Multiplying binomials in two variables
- Multiplying conjugate binomials: Univariate
- Squaring a binomial: Univariate
- Multiplication involving binomials and trinomials in two variables

*Section 4.4* (2 topics)

- Dividing a polynomial by a monomial: Univariate
- Dividing a polynomial by a monomial: Multivariate

*Section 4.5* (8 topics)

- Introduction to the GCF of two monomials
- Greatest common factor of two multivariate monomials
- Factoring out a monomial from a polynomial: Univariate
- Factoring out a monomial from a polynomial: Multivariate
- Factoring a univariate polynomial by grouping: Problem type 1
- Factoring a univariate polynomial by grouping: Problem type 2
- Factoring a multivariate polynomial by grouping: Problem type 1
- Factoring a multivariate polynomial by grouping: Problem type 2

*Section 4.6* (8 topics)

- Factoring a quadratic with leading coefficient 1
- Factoring a quadratic with leading coefficient greater than 1: Problem type 1
- Factoring a quadratic with leading coefficient greater than 1: Problem type 2
- Factoring a quadratic in two variables with leading coefficient greater than 1
- Factoring a perfect square trinomial with leading coefficient 1
- Factoring a perfect square trinomial with leading coefficient greater than 1
- Factoring a perfect square trinomial in two variables
- Factoring a product of a quadratic trinomial and a monomial

*Section 4.7* (4 topics)

- Factoring a difference of squares in one variable: Advanced

- Factoring a difference of squares in two variables
- Factoring with repeated use of the difference of squares formula
- Factoring a sum or difference of two cubes

*Section 4.8* (6 topics)

- Solving an equation written in factored form
- 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 word problem using a quadratic equation with rational roots
- Pythagorean Theorem

*Chapter 4 Supplementary Topics* (1 topic)

- Degree of a multivariate polynomial

(\* Some topics in this section are also covered in a previous section of this Objective.  
Topics are only counted once towards the total number of topics for this Objective.

**Chapter 5 - Rational Expressions and Rational Equations** (36 topics, no due date)

*Section 5.1* (3 topics)

- Domain of a rational function: Excluded values
- Simplifying a ratio of polynomials: Problem type 1
- Simplifying a ratio of polynomials: Problem type 2

*Section 5.2* (4 topics)

- 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

*Section 5.3* (8 topics)

- Introduction to the LCM of two monomials
- Least common multiple of two monomials
- Adding rational expressions with common denominators and binomial numerators
- Adding rational expressions with denominators  $ax$  and  $bx$ : Basic
- Adding rational expressions with denominators  $ax$  and  $bx$ : Advanced
- Adding rational expressions with linear denominators without common factors: Basic
- Adding rational expressions with linear denominators without common factors: Advanced
- Adding rational expressions involving different quadratic denominators

*Section 5.4* (7 topics)

- Complex fraction without variables: Problem type 2
- Complex fraction involving univariate monomials
- Complex fraction involving multivariate monomials
- Complex fraction: GCF factoring
- Complex fraction: Quadratic factoring
- Complex fraction made of sums involving rational expressions: Problem type 1
- Complex fraction made of sums involving rational expressions: Problem type 2

*Section 5.5* (7 topics)

- 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: Denominators  $a$ ,  $x$ , or  $ax$
- Solving a rational equation that simplifies to linear: Unlike binomial denominators
- 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 for a variable in terms of other variables in a rational equation: Problem type 1

*Section 5.6* (5 topics)

- Solving a proportion of the form  $a/(x+b) = c/x$
- Word problem on proportions: Problem type 1
- Word problem on proportions: Problem type 2

- Word problem involving multiple rates
- Solving a work problem using a rational equation

*Chapter 5 Supplementary Topics* (2 topics)

- Simplifying a ratio of multivariate polynomials
- Solving a rational equation that simplifies to quadratic: Proportional form, advanced

**Chapter 6 - Radicals and Complex Numbers** (26 topics, no due date)

---

*Section 6.1* (5 topics)

- Square root of a perfect square
- Pythagorean Theorem
- Square root of a rational perfect square
- Square root of a perfect square monomial
- Cube root of an integer

*Section 6.2* (5 topics)

- Converting between radical form and exponent form
- 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

*Section 6.3* (5 topics)

- Simplifying the square root of a whole number less than 100
- Simplifying a radical expression with an even exponent
- Simplifying a radical expression with two variables
- Simplifying a higher root of a whole number
- Simplifying a higher radical expression: Multivariate

*Section 6.4* (2 topics)

- Square root addition or subtraction
- Simplifying a sum or difference of radical expressions: Multivariate

*Section 6.5* (4 topics)

- 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

*Section 6.6* (4 topics)

- Rationalizing a denominator: Quotient involving square roots
- Rationalizing a denominator: Square root of a fraction
- Rationalizing a denominator using conjugates: Integer numerator
- Rationalizing a denominator using conjugates: Square root in numerator

*Section 6.7* (1 topic)

- Solving an equation using the odd-root property: Problem type 1

**Chapter 7 - Quadratic Equations, Functions, and Inequalities** (18 topics, no due date)

---

*Section 7.1* (4 topics)

- Solving a quadratic equation using the square root property: Exact answers, basic
- Solving a quadratic equation using the square root property: Exact answers, advanced
- Completing the square
- Solving a quadratic equation by completing the square: Exact answers

*Section 7.2* (3 topics)

- Applying the quadratic formula: Exact answers
- Discriminant of a quadratic equation
- Solving a word problem using a quadratic equation with irrational roots

*Section 7.3* (4 topics)

- 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 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

*Section 7.4* (2 topics)

- Graphing a parabola of the form  $y = ax^2$
- How the leading coefficient affects the shape of a parabola

*Section 7.5* (2 topics)

- Finding the x-intercept(s) and the vertex of a parabola
- Word problem involving the maximum or minimum of a quadratic function

*Section 7.6* (3 topics)

- Roots of a product of polynomials
- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality