



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2008-09
(i.e. 2003-2004)

NEXT REVIEW: 2013-14
(i.e. 2008-2009)

STATUS: A
(A, I, D)

COURSE TITLE: ELEMENTARY ALGEBRA

COMMON COURSE NUMBER: MAT 0024L

CREDIT HOURS: 4

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

Lecture: **48** Lab:
Clinic: Other:

PREREQUISITE(S): None.

COREQUISITE(S): MAT 0024

PRE/COREQUISITE(S):

COURSE DESCRIPTION: *(750 characters, maximum)*

A course designed for students comfortable performing arithmetic without a calculator and solving linear equations. This course will broaden students' algebra skills to include solving linear inequalities, polynomial factoring, solving quadratic equations, laws of exponents, rational & radical expressions, and graphing of lines. Problem solving involving real-life scenarios is an integral part of this course. This course will teach students to understand and communicate concepts of algebra in the language of mathematics, both orally and written. This course enhances students' problem-solving skills, and helps prepare the student for college-level mathematics and mathematics-based courses. It is nontransferable. Due to the nature of this course, calculators are not permitted. To pass the course, students must pass a mandatory Florida State Examination.

UNIT TITLES

1. Arithmetic Review (Optional)
2. Order of Operations Review & Linear Equations in One Variable
3. Linear Inequalities in One Variable
4. Rules of Integer Exponents
5. Polynomial Expressions, Quadratic Expressions, & Quadratic Equations
6. Rational Expressions
7. Radical Expressions
8. The Rectangular Coordinate System
9. Lines, Slope, & Graphical Solutions to Systems of Linear Equations
10. Sets (Optional)



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EVALUATION:

Please provide a brief description (250 characters maximum) that details how students will be evaluated on the course outcomes.

**** Complete the following only if course is seeking general education status ****

GENERAL EDUCATION Competencies and Skills *:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

| | |
|---|--|
| 1. Read with critical comprehension | |
| 2. Speak and listen effectively | |
| 3. Write clearly and coherently | |
| 4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate) | |
| 5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental) | |
| 6. Apply problem solving techniques to real-world experiences | |
| 7. Apply methods of scientific inquiry | |
| 8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings | |
| 9. Demonstrate an understanding of and appreciation for human diversities and commonalities | |
| 10. Collaborate with others to achieve common goals. | |
| 11. Research, synthesize and produce original work | |
| 12. Practice ethical behavior | |
| 13. Demonstrate self-direction and self motivation | |
| 14. Assume responsibility for and understand the impact of personal behaviors on self and society | |
| 15. Contribute to the welfare of the community | |

** General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

Common Course Number: MAT 0024

UNITS

Unit 1 Arithmetic Review (Optional)

General Outcome:

- 1.0 The student shall be able to (1) identify whole numbers, integers, fractions & mixed numbers, (2) perform basic operations on numbers, (3) graph numbers on a number line, and (4) solve appropriate word problems without the aid of a calculator.**

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1** Identify number families: Natural, Whole, Integer, Rational, Irrational, Real.
- 1.2** Graph numbers on a number line.
- 1.3** Identify the associative, commutative, distributive, identity, and inverse properties of numbers, and manipulate numerical expressions using these properties.
- 1.4** Perform operations on, and solve appropriate word problems involving, whole numbers.
- 1.5** Perform operations on, and solve appropriate word problems involving, integers.
- 1.6** Perform operations on, and solve appropriate word problems involving, fractions & mixed numbers.
- 1.7** Perform operations on, and solve appropriate word problems involving, decimal numbers.
- 1.8** Perform operations on, and solve appropriate word problems involving, percents.



Unit 2 Order of Operations Review & Linear Equations in One Variable

General Outcome:

2.0 The student shall be able to (1) simplify numerical expressions using order of operations, (2) solve linear equations in one variable, (3) solve literal equations for a specified variable, and (4) solve appropriate word problems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Define the term “absolute value.”
- 2.2 Determine the absolute value of any real number, and simplify numerical expressions involving absolute value.
- 2.3 Simplify numerical expressions using order of operations.
- 2.4 Solve appropriate word problems involving order of operations. **(OPTIONAL)**
- 2.5 Define the terms “variable” and “coefficient.”
- 2.6 Evaluate the numerical values of expressions given the values of the variables.
- 2.7 Simplify algebraic expressions using the distributive property and/or combining like terms.
- 2.8 Explain what it means to be a solution to an equation in one variable.
- 2.9 Determine if a given variable value is a solution to an equation.
- 2.10 Solve one-step and multi-step linear equations in one variable.
- 2.11 Solve linear equations in one variable with variables on both sides of the equal sign.
- 2.12 Solve linear equations in one variable requiring use of the distributive property.
- 2.13 Identify linear equations in one variable as conditional, a contradiction, or an identity.
- 2.14 Solve proportionalities.
- 2.15 Solve appropriate algebraic and geometric word problems by modeling them with linear equations in one variable or proportionalities.
- 2.16 Solve literal equations for a specified variable.



Unit 3 Linear Inequalities in One Variable

General Outcome:

3.0 The student shall be able to solve linear inequalities in one variable, and express solutions using inequality notation, interval notation, and a number-line graph.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Explain what it means to be a solution to an inequality in one variable.**
- 3.2 Determine if a given variable value is a solution to an inequality in one variable.**
- 3.3 Solve one-step and multi-step linear inequalities in one variable.**
- 3.4 Solve linear inequalities in one variable with variables on both sides of the equal sign.**
- 3.5 Solve linear inequalities in one variable requiring use of the distributive property.**
- 3.6 Present solutions to linear inequalities in one variable in three ways: Inequality notation, interval notation, and graphically on a number line.**
- 3.7 Present already-solved, three-part linear inequalities in one variable (e.g. $-3 < y \leq 5.3$) in interval notation and graphically on a number line. (OPTIONAL)**



Unit 4 Rules of Integer Exponents

General Outcome:

4.0 The student shall be able to simplify product and quotient expressions incorporating variables with integer exponents using appropriate rules of integer exponents.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1** Define the terms “base,” “exponent,” and “power.”
- 4.2** Identify the base and exponent (or power) of exponential expressions.
- 4.3** Apply the product rule for exponents to simplify appropriate variable expressions.
- 4.4** Apply the quotient rule for exponents to simplify appropriate variable expressions.
- 4.5** Apply the power rules for exponents to simplify appropriate variable expressions.
- 4.6** Apply the zero-exponent rule to simplify appropriate variable expressions.
- 4.7** Apply the negative-exponent rule to simplify appropriate variable expressions.
- 4.8** Apply any combination of exponent rules to simplify appropriate variable expressions.
- 4.9** Express standard numbers in scientific notation and vice versa.
- 4.10** Multiply and divide numbers written in scientific notation.



Unit 5 Polynomial Expressions, Quadratic Expressions, & Quadratic Equations

General Outcome:

5.0 The student shall be able to (1) identify, perform operations on, and factor polynomial expressions; (2) solve quadratic equations in one variable; and (3) solve appropriate word problems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Identify polynomial expressions.
- 5.2 Define the terms “leading term (of a polynomial)” and “degree (of a polynomial).”
- 5.3 Identify the leading term and the degree of polynomials.
- 5.4 Recognize if a given polynomial is a monomial, binomial, or trinomial.
- 5.5 Evaluate the numerical value of polynomial expressions given the value of the variable.
- 5.6 Identify and combine like terms of polynomials.
- 5.7 Add, subtract, and multiply polynomials.
- 5.8 Divide polynomials by monomials.
- 5.9 Factor out positive and negative GCFs of polynomials’ terms.
- 5.10 Factor polynomial expressions by grouping.
- 5.11 Factor binomial expressions that are differences of perfect squares.
- 5.12 Factor binomial expressions that are sums and differences of perfect cubes.
- 5.13 Identify quadratic polynomial expressions.
- 5.14 Factor non-prime quadratic trinomials, including perfect square trinomials.
- 5.15 Solve non-prime polynomial equations in one variable by factoring.
- 5.16 Solve appropriate algebraic and geometric word problems by modeling them with non-prime quadratic equations in one variable.



Unit 6 Rational Expressions

General Outcome:

6.0 The student shall be able to identify and simplify rational expressions.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

6.1 Define the term “rational expression.”

6.2 Identify rational expressions.

6.3 Determine value(s) of the variable for which rational expressions are undefined.

6.4 Simplify rational expressions by canceling common monomial and binomial factors of the numerator and denominator.

6.5 Multiply rational expressions. (OPTIONAL)

6.6 Divide rational expressions. (OPTIONAL)



Unit 7 Radical Expressions

General Outcome:

7.0 The student shall be able to identify, simplify, and perform operations of addition and subtraction on radical expressions.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 7.1 Define the terms “square root,” “radical,” and “radicand.”
- 7.2 Define the terms “ n^{th} root” and “index.” (OPTIONAL)
- 7.3 Simplify square root numerical expressions.
- 7.4 Determine approximate square roots of numerical expressions.
- 7.5 Explain why the square root of a negative number is not real.
- 7.6 Simplify n^{th} root numerical expressions. (OPTIONAL)
- 7.7 Explain why any even root of a negative number is not real. (OPTIONAL)
- 7.8 Simplify square root variable expressions.
- 7.9 Simplify n^{th} root variable expressions. (OPTIONAL)
- 7.10 Add & subtract square root expressions.
- 7.11 Add & subtract higher-order radical expressions with identical indices. (OPTIONAL)
- 7.12 Explain what the Pythagorean Theorem says and means.
- 7.13 Solve appropriate word problems using the Pythagorean Theorem.



Unit 8 The Rectangular Coordinate System

General Outcome:

8.0 The student shall be able to (1) identify the quadrants of the rectangular coordinate system, (2) plot points corresponding to ordered-pair coordinates, and (3) identify the ordered-pair coordinates of points plotted on the rectangular coordinate system.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

8.1 Identify and draw the rectangular coordinate system axes.

8.2 Identify and name each quadrant of the rectangular coordinate system.

8.3 Define the term “origin,” and identify the origin of the rectangular coordinate system.

8.4 Plot points on the rectangular coordinate system representing given ordered-pair coordinates.

8.5 Plot points on the axes representing given ordered-pair coordinates.

8.6 Give the ordered-pair coordinates of points plotted on the rectangular coordinate system.



Unit 9 Lines, Slope, & Graphical Solutions to Systems of Linear Equations

General Outcome:

9.0 The student shall be able to (1) evaluate and interpret the slope of a line, (2) graph lines given two points or a point and the slope, (3) use the slope to determine additional points on a line, (4) graph horizontal and vertical lines, and (5) determine the solution to a system of linear equations graphically.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 9.1** Explain what it means to be a solution to an equation in two variables.
- 9.2** Determine if a given ordered pair is a solution to an equation in two variables.
- 9.3** Define the terms “x- (or horizontal) intercept” and “y- (or vertical) intercept.”
- 9.4** Sketch the graphs of linear equations in two variables given any two points.
- 9.5** Sketch the graphs of linear equations in two variables given the x- and y-intercepts.
- 9.6** Identify and determine the x- and y-intercepts of graphs of linear equations of two variables.
- 9.7** Sketch horizontal and vertical lines using their equations.
- 9.8** Determine the equations of horizontal and vertical lines.
- 9.9** Define the term “slope.”
- 9.10** Evaluate the slopes of horizontal, vertical, and diagonal lines.
- 9.11** Interpret the practical meaning of slope in appropriate word problems.
- 9.12** Sketch graphs of linear equations in two variables given any point and the slope.
- 9.13** Use the slope to determine additional points on the graphs of lines.
- 9.14** Explain what it means to be a solution to a system of linear equations in two variables.
- 9.15** Determine if a given ordered pair is a solution to a system of linear equations in two variables.
- 9.16** Solve systems of linear equations in two variables having exactly one solution by graphing.



Unit 10 Sets (Optional)

General Outcome:

10.0 The student shall be able to identify & create sets, and perform basic operations on sets.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 10.1** Define the terms “set” and “element.”
- 10.2** Create a set by listing its elements.
- 10.3** Identify elements and non-elements of a set using the notation \in and \notin .
- 10.4** Define the term “empty (or null) set.”
- 10.5** Determine if a given set is finite or infinite.
- 10.6** Define the term “subset.”
- 10.7** Identify whether a set is or is not a subset of another using the notation \subseteq and $\not\subseteq$.
- 10.8** Determine the number of distinct subsets there are of a given set.
- 10.9** Define the terms “universal set (or universe),” “complement,” “union,” and “intersection.”
- 10.10** Determine the complement of any set by listing its elements.
- 10.11** Determine the union of any two sets by listing its elements.
- 10.12** Determine the intersection of any two sets by listing its elements.
- 10.13** Define the term “disjoint.”
- 10.14** Determine if any two sets are disjoint.