YukonCollege

COURSE OUTLINE

MATH 050

ELEMENTARY AND INTERMEDIATE ALGEBRA

139.5 HOURS

6 CREDITS

PREPARED BY: Gerald Haase, Instructor   DATE: January 2019

APPROVED BY: Erica Bourdon, Chair   DATE: January 2019

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RENEWED BY ACADEMIC COUNCIL:

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ELEMENTARY AND INTERMEDIATE ALGEBRA

INSTRUCTOR: Gerald Haase

OFFICE LOCATION: A2320

E-MAIL: ghaase@yukoncollege.yk.ca

TELEPHONE: 668-8757

OFFICE HOURS: Wednesdays 10-12:00

CLASSROOM: A2603

TIME: Lectures: Monday to Friday
8:30 a.m. to 10:00 p.m.
Wednesdays 2:30 to 4:00 p.m.
Fridays 10:30 a.m. to 12:00 noon

DATES: as above

COURSE DESCRIPTION

Elementary and Intermediate Algebra is intended for students who have little previous experience with algebra. Most topics will be introduced at an elementary level before continuing to the intermediate level. Elementary and Intermediate Algebra consists of algebra and real numbers, solving equations and inequalities, graphs of equations and functions, trigonometry, systems of equations, polynomials and polynomial functions, rational expressions, equations and functions, radical expressions, equations and functions, quadratic equations and functions, and introductory statistics.

PREREQUISITES

High school Mathematics grade 10 with Algebra, Yukon College Math 030 with the permission of the instructor, Yukon College Math 040 with a grade of B- (65%) or better, or any college equivalent with a grade of B- (65%) or better.

RELATED COURSE REQUIREMENTS

A scientific calculator is required; however, students are not permitted to use a graphing calculator.

EQUIVALENCY OR TRANSFERABILITY

Yukon College Math 050 is articulated as Advanced Algebraic Mathematics in the Adult Basic Education system (ABE) in British Columbia and Yukon. For more information please refer to the BC Adult Basic Education Articulation Handbook which may be found at http://www.bctransferguide.ca/search/abe

Advanced Algebraic Mathematics is considered an Equivalent to Pre-Calculus 11 by the British Columbia Ministry of Education.

LEARNING OUTCOMES

For specific learning outcomes see Topic Outline

COURSE FORMAT

There will be seven one-and-a-half hour classes per week. The course content will be covered primarily through lectures with the aid of a textbook.

ASSESSMENTS

Assignments

There are many practice exercises in the textbook. After each of the ten chapters, an assignment will be handed in. Late assignments will be docked 10%; however, assignments cannot be accepted after they have been returned to the class. A student planning to be away on the due date must submit the assignment prior to leaving. If the due date is missed owing to an emergency, an alternate assignment may be given.

Tests

There are three exams covering the contents. The third exam is a cumulative final exam.

EVALUATION

Assignments		20 %
Midterm 1	Chapters 1 to 3	25 %
Midterm 2	Chapters 4 to 6	25 %
Final Exam	Chapters 1 to 9, with emphasis on 7 to 9	30 %
Total		100 %

Rewrites
A rewrite for a failing grade on an examination (less than 50%) may be permitted at the instructor's discretion. These examinations will be written no earlier than two weeks after the date of the original examination. The mark will be recorded whether it is higher or lower than the original; however, a maximum mark of 65% will be awarded.

"No Shows"
A student who misses an examination will receive a mark of zero for that examination but may be permitted a rewrite. Exceptions may be made if a student receives prior permission from the instructor, or faces an emergency. Some form of documentation of the emergency may be required.

REQUIRED TEXTBOOKS AND MATERIALS

<u>TBA</u>
Writing paper, graph paper, ruler, pencils etc., scientific calculator.

<u>Optional:</u>

MyMathLab online resources (see instructor for access code)
YouTube videos: search for: Bittinger Intermediate Algebra
Khan Academy videos on intermediate algebra

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/ Admissions & Registration web page.

Attendance Policy

It is the student's responsibility to attend classes. Students who miss classes are responsible for any work missed.

Electronic Devices

In order to be successful in classes and minimize distractions for others, cell phones, iPods and other electronic devices must be turned off while students are in class. In an emergency situation, the instructor may give a student permission to use a cell phone or pager.

Appropriate Language

In all areas of the college environment students are responsible to show respect for others; swearing, or language that is discriminatory or derogatory in relation to race, sex, ethnic background, religious beliefs, age and physical condition is not appropriate.

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when a student submits work for credit that includes the words, ideas, or data of others, without citing the source from which the material is taken. Plagiarism can be the deliberate use of a whole piece of work, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Students may use sources which are public domain or licensed under Creative Commons; however, academic documentation standards must still be followed. Except with explicit permission of the instructor, resubmitting work which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see https://www.yukoncollege.yk.ca/yfnccr.

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in Section 8.0 of the Yukon College Academic Regulations (available on the Yukon College website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785 or lassist@yukoncollege.yk.ca.

TOPIC OUTLINE

Mathematics 050 covers the Core Topics for Advanced Algebraic Mathematics in the BC Adult Basic Education Articulation Handbook which may be found at http://www.bctransferguide.ca/search/abe

1. **Basic Algebra Review**

   a) Use roster and set builder notation to name sets, and distinguish among various kinds of real numbers. Determine which of two real numbers is greater and indicate which using inequality notation.
   b) Graph inequalities on a number line.
   c) Find the absolute value of a real number.
   d) Add, subtract, multiply, and divide real numbers.
   e) Rewrite expressions with whole number exponents and evaluate exponential expressions.
   f) Rewrite expressions with or without negative integers as exponents.
   g) Simplify expressions using the rules for order of operations.
   h) Translate a phrase into an algebraic expression.
   i) Evaluate an algebraic expression by substitution.
   j) Determine whether two expressions are equivalent by completing a table of values, using commutative, associative and distributive laws.
   k) Simplify expressions by collecting like terms and by removing parenthesis.
   l) Use exponential notation in multiplication and division.
   m) Use exponential notation in raising a power to a power, and in raising a product or quotient to a power.
   n) Convert between decimal notation and scientific notation and use scientific notation with multiplication and division.

2. **Solving Linear Equations and Inequalities**

   a) Determine whether a given number is a solution of a given equation.
   b) Solve equations using the addition principle, the multiplication principle, or both.
   c) Evaluate formulas and solve formulas for a specified letter.
   d) Solve applied problems by translating to equations.
   e) Solve basic motion problems.

f) Determine whether a given number is a solution of an inequality.

g) Write interval notation for the solution set or graph of an inequality.

h) Solve an inequality using the addition and multiplication principles and then graph the inequality.

i) Solve applied problems by translating to inequalities.

j) Find the intersection of two sets. Solve and graph conjunctions of inequalities.

k) Find the union of two sets. Solve and graph disjunctions of inequalities.

l) Solve applied problems involving conjunctions and disjunctions of inequalities.

m) Simplify expressions containing absolute value symbols.

n) Solve equations with absolute value expressions.

3. Graphs, Functions, and Applications

a) Plot points associated with ordered pairs of numbers.

b) Determine whether an ordered pair of numbers is a solution of an equation.

c) Graph linear equations using tables.

d) Graph non-linear equations using tables.

e) Determine whether a correspondence is a function.

f) Given a function described by an equation, find function values for specified values.

g) Draw the graph of a function.

h) Determine whether a graph is that of a function using the vertical line test.

i) Solve applied problems involving functions and their graphs.

j) Find the domain and range of a function.

k) Find the intercept of a line from the equation $y = mx + b$ or $f(x) = mx + b$.

l) Given two points on a line, find the slope; given a linear equation, derive the equivalent slope-intercept equation and determine the slope and the y-intercept.

m) Solve applied problems involving slope.

n) Graph linear equations using intercepts.

o) Given a linear equation in slope-intercept form, use the slope and the y-intercept to graph the line.

p) Graph linear equations of the form $x = a$ or $y = b$.

q) Given the equations of two lines, determine whether their graphs are parallel or perpendicular.

r) Find the equation of a line when the slope and the y-intercept are given.

s) Find the equation of a line when the slope and a point is given.

t) Find the equation of a line when two points are given.

u) Given a line and a point not on the given line, find an equation of the line parallel to the line and containing the point, and find an equation of the line perpendicular to the line and containing the point.

v) Solve applied problems involving linear functions.

w) Using a set of data, draw a representative graph of a linear function and make predictions from the graph.

x) Using a set of data, choose two representative points, find a linear function using the two points, and make predictions from the function.

4. Systems of Equations

a) Solve a system of two linear equations or two functions by graphing and determine whether a system is consistent or inconsistent and whether it is dependent or independent.

b) Solve systems of equations in two variables by the substitution method.

c) Solve systems of equations in two variables by the elimination method.

d) Solve applied problems by solving systems of two equations using substitution or elimination.

e) Solve applied problems involving total value and mixture using systems of two equations.

f) Solve applied problems involving motion, using systems of two equations.

g) Given total cost and total revenue functions, find the total profit function and the break-even point.

h) Given supply and demand functions, find the equilibrium point.

i) Graph linear inequalities in two variables.

5. Polynomials and Polynomial Functions

a) Identify the degree of each term and the degree of a polynomial; identify terms, coefficients, monomials, binomials, and trinomials; arrange polynomials in ascending or descending order; and identify the leading coefficient.

b) Evaluate a polynomial function for given inputs.

c) Collect like terms in a polynomial and add polynomials.

d) Find the opposite of a polynomial and subtract polynomials.

e) Multiply any two polynomials.

f) Divide a polynomial by a monomial.

g) Use the FOIL method to multiply two binomials.

h) Use a rule to square a binomial.

i) Use a rule to multiply a sum and a difference of the same two terms.

j) For function f described by second-degree polynomials, find and simplify notation like $f(a +h)$ and $f(a + h) - f(a)$.
k) Factor polynomials whose terms have a common factor.
l) Factor certain polynomials with four terms by grouping.
m) Factor trinomials of the type $x^2 + bx + c$.
n) Factor trinomials of the type $ax^2 + bx + c$ by the FOIL method.
o) Factor trinomials of the type $ax^2 + bx + c$ by the grouping method.
p) Factor trinomial squares.
q) Factor differences of squares.
r) Factor certain polynomials with four terms by grouping and possibly using the factoring of a trinomial square or the difference of squares.
s) Factor sums and differences of cubes.
t) Solve quadratic and other polynomial functions by first factoring and then using the principle of zero products.
u) Solve applied problems involving quadratic and polynomial equations that can be solved by factoring.

6. Rational Expressions, Equations, and Functions

a) Find all numbers for which a rational number is undefined or that are not in the domain of a rational function.
b) Simplify rational expressions.
c) Multiply, divide, add and subtract rational expressions.

d) Simplify complex rational expressions.
e) Solve rational equations.
f) Solve work problems and certain basic problems using rational equations.
g) Solve applied problems involving proportions.
h) Solve motion problems using rational equations.
i) Solve a formula for a letter.
j) Find an equation of direct, inverse, or other kinds of variation given values of the variables.
k) Solve applied problems involving direct, inverse, or other kinds of variation.

7. Radical Expressions, Equations, and Functions

a) Find principal square roots and their opposites, approximate square roots, find outputs of square root functions, graph square root functions, and find the domains of square root functions.
b) Simplify radical expressions with perfect square radicands.
c) Find cube roots, simplifying certain expressions, and find outputs of cube root functions.
d) Simplify expressions involving odd and even roots.
e) Write expressions with or without rational exponents, and simplify, if possible.

f) Write expressions without negative exponents, and simplify, if possible.

g) Use the laws of exponents with rational exponents.

h) Use rational exponents to simplify radical expressions.

i) Multiply, divide, add or subtract, and simplify radical expressions.

j) Multiply expressions involving radicals in which some factors contain more than one term.

k) Rationalize the denominator of a radical expression having one or two terms in the denominator.

l) Solve radical equations with one or two radical terms.

m) Solve applied problems involving radical equations.

n) Solve applied problems involving the Pythagorean Theorem and powers and roots.

o) Express imaginary numbers as bi, where b is a nonzero real number, and complex numbers as $a + bi$, where a and b are real numbers.

8. **Quadratic Equations and Functions**

a) Determine the nature of the solutions of a quadratic equation.

b) Solve quadratic equations using the principle of square roots and find the x-intercepts of the graph of a related function.

c) Solve quadratic equations by completing the square.

d) Solve applied problems using quadratic equations.

e) Solve quadratic equations using the quadratic formula, and approximate solutions using a calculator.

f) Solve applied problems involving quadratic equations.

g) Solve a formula for a given letter.

h) Write a quadratic equation having two numbers specified as solutions.

i) Solve equations that are reducible to quadratic.

j) Graph quadratic functions of the type $f(x) = a(x - h)^2 + k$, finding the vertex, line of symmetry, and the maximum or minimum y-value.

k) For a quadratic function given in the form $f(x) = ax^2 + bx + c$, find the vertex, the line of symmetry, and the maximum or minimum value, and graph the function.

l) Find the intercepts of a quadratic function.

m) Solve maximum minimum problems involving quadratic functions.

n) Fit quadratic function to a set of data to form a mathematical model, and sole related applied problems.

9. **Triangles and Applications**

a) Label the sides of a right triangle with respect to a given angle.
b) Determine the three trigonometric ratios for a triangle not in standard position.
c) Solve right triangles.
d) Solve problems involving the use of right triangles and the trigonometric functions.
e) Use the law of sines to solve any triangle, given a side and two angles.
f) Use the law of sines to solve triangles, given two sides and an angle opposite one of them, finding two solutions when they exist, and recognizing when a solution does not exist.
g) Use the law of cosines, with the law of sines, to solve any triangle, given two sides and the included angle.
h) Use the law of cosines to solve any triangle, given three sides.

10. Statistics

a) Determine the factors that must be considered when collecting data (sampling) for statistical analysis.
b) Calculate sample standard deviation.
c) Use sample standard deviation as a measure of sample variation.
d) Calculate z-values and perform z-tests to test for differences between sample populations and a single datum value.
e) Calculate confidence intervals and use these to test for differences between sample populations and a single datum value.