COLLEGE OF THE ROCKIES

Mathematics, Advanced Level – MATH 080
Access Education/Upgrading for Academic and Career Entry

Course Outline

COURSE IMPLEMENTATION DATE:	**Pre 1998**
OUTLINE EFFECTIVE DATE:	**September 2020**
COURSE OUTLINE REVIEW DATE:	**March 2025**

GENERAL COURSE DESCRIPTION:

This course covers a variety of topics in algebra and trigonometry to help prepare students for entry into programs or courses requiring a Pre-Calculus 11 or Principles 11 prerequisite. A positive attitude about math is not essential, but it helps make learning math more productive. It is hoped that all students will increase their competence and appreciation of math through taking this course.

Program Information: This course fulfills the math requirement for the BC Adult Graduation Diploma.

Delivery: This course is delivered face-to-face and in a directed studies format.

ABE Credits: 3

Hours for this course: 112.5 hours

Typical Structure of Instructional Hours:

Instructional Activity	Duration
Lecture Hours	90
Seminars / Tutorials	
Laboratory / Studio Hours	
Practicum / Field Experience Hours	
Other Contact Hours	22.5
Total	112.5

Practicum Hours (if applicable):

Type of Practicum	Duration
On-the-job Experience	N/A
Formal Work Experience	N/A
Other	N/A
Total	

Other Contact Hours:
- Guided Practice

Course Outline Author or Contact:

Deb Heal, BEd

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Signature

APPROVAL SIGNATURES:

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Department Head Signature

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EDCO

Valid from: September 2020 – March 2025

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Education Council Approval Date

COURSE PREREQUISITES AND TRANSFER CREDIT:

Prerequisites: Either MATH 070, MATH 082, Foundations of Mathematics and Pre-Calculus 10 or equivalent.

Corequisites: None

Flexible Assessment (FA):

Credit can be awarded for this course through FA   ☑ Yes   ☐ No

Learners may request formal recognition for flexible assessment at the College of the Rockies through one or more of the following processes: External Evaluation, Worksite Assessment, Demonstration, Standardized Test, Self-assessment, Interview, Products/Portfolio, Challenge Exam. Contact an Education Advisor for more information.

Transfer Credit: For transfer information within British Columbia, Alberta and other institutions, please visit http://www.cotr.bc.ca/Transfer.

Students should also contact an academic advisor at the institution where they want transfer credit.

Prior Course Number: N/A

Textbooks and Required Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Face-to-Face Delivery:

Martin-Gay, K. Elayn, (2012). *Intermediate Algebra*, (5th ed.). Publisher: Prentice-Hall.

Please see the instructor's syllabus or check COTR's online text calculator
http://go.cotr.bc.ca/tuition/tCalc.asp *for a complete list of the currently required textbooks.*

LEARNING OUTCOMES:

Upon the successful completion of this course, students will be able to demonstrate competency in Core Advanced Level – Algebraic Learning Outcomes as stated in the 2016/2017 ABE – BC Articulation Handbook.

It is expected that learners will use a scientific calculator to evaluate complex expressions with emphasis on using special keys to perform a variety of functions. The use of a graphing calculator or other technology is optional.

1. Basic Algebraic Skills Review

While not required as core, the following outcomes are reviewed in this course:

- perform operations with real numbers including absolute value and exponential notation;
- simplify expressions using rules for order of operations and properties of exponents;
- translate common language into algebraic expressions;
- evaluate algebraic expressions by substitution;

2. Solving Linear Equations and Inequalities;
- simplify algebraic expressions with nested parentheses;
- solve first degree/linear equations in one variable;
- solve simple formulas for a given variable;
- solve and graph linear inequalities in one variable;
- write set-builder and/or interval notation for the solution set or graph of an inequality;
- use linear equations, formulas and linear inequalities to solve applied problems;
- find the union or intersection of two sets;
- solve and graph compound inequalities (conjunctions and disjunctions);
- solve absolute value equations;

3. Graphing, Relations, and Functions
- write linear equations in slope-intercept form;
- graph linear equations and non-linear equations using a table of values;
- graph linear equations using the y-intercept and slope and using x- and y-intercepts;
- graph horizontal and vertical lines;
- find the slope of a line given two points on the line;
- find the equation of a line given graphic data: the slope and y-intercept, the slope and one point, or two points on the line;

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- determine whether a pair of lines is parallel, perpendicular or neither;
- find the equation of a line parallel or perpendicular to a given line and through a given point;
- use the definition of function and the vertical line test to distinguish between functions and non-functions;
- use and interpret function notation to evaluate functions for given x-values and find x-values for given function values;
- determine the domain and range of a function;
- use a table of values to graph linear functions and non-linear functions such as quadratic, cubic, square root, reciprocal, and absolute value functions;
- graph linear inequalities in two variables;

4. Systems of Linear Equations and Inequalities
   - solve systems of linear equations in two variables by graphing, substitution and elimination methods;
   - determine if a system of equations will have no, one, or an infinite number of solutions; and
   - use systems of equations to solve applied problems.

While not required as core, the following outcomes may be covered if time permits:

- solve systems of equations in three variables and applied problems using such systems;
- graph the solution for a system of linear inequalities in two variables;

5. Polynomials and Polynomial Functions
   - determine the degree of a polynomial;
   - distinguish between monomials, binomials, trinomials, and other polynomials;
   - add, subtract, multiply polynomials;
   - divide polynomials by monomials;
   - factor polynomials using an appropriate strategy or a combination of techniques: common factors, difference of squares, difference and sum of cubes, perfect square trinomials, trial/error, or grouping;
   - solve polynomial equations using the principle of zero products; and
   - solve applied problems using polynomial equations/ functions.

While not required as core, the following outcomes will be covered in this course:

- divide polynomials and binomials using long division;
- divide polynomials and binomials using synthetic division;

6. Rational Expressions, Rational Equations and Variation
   - identify situations and find values for which a rational expression will be undefined;
   - simplify rational expressions;
   - add, subtract, multiply and divide rational expressions;
   - solve rational equations and check;
   - solve formulas involving rational expressions for a given variable;
   - solve applied problems that can be modeled with rational equations;
   - simplify complex fractions;
   - express variations in the form of equations (direct, inverse, joint, combined);
   - solve problems involving direct, inverse, joint and combined variation;

7. Radical Expressions and Radical Equations
- identify situations and find values for which a radical expression will be undefined;
- write radicals as powers with rational exponents and vice versa;
- use rational exponents to simplify radical expressions;
- simplify, add, subtract, multiply, and divide radical expressions (numeric or algebraic);
- rationalize denominators in fractional expressions containing radicals (including the use of conjugates);
- solve equations involving radical expressions or powers with rational exponents and check for extraneous roots;
- solve formulas involving powers and square roots for a given variable; and
- solve applied problems which can be modeled by radical equations, and determine if solutions are reasonable given the context of the problem.

While not required as core, the following outcomes will be covered in this course:

- identify imaginary and complex numbers and express them in standard form add, subtract, multiply, and divide complex numbers;

8. Quadratic Equations and Quadratic Functions
- solve quadratic equations by factoring, principle of square roots, completing the square and the quadratic formula;
- use the discriminate to identify the number and type of solutions of a quadratic equation;
- write a quadratic equation given its solutions;
- solve rational and radical equations reducible to a quadratic pattern and check that answers are reasonable;
- solve selected polynomial equations that can be factored simplifying to linear and/or quadratic factors;
- graph quadratic functions of the form $f(x) = a(x - h)^2 + k$ and demonstrate translations, reflections and stretching/shrinking resulting from changes in the function equation;
- find the vertex, line of symmetry, minimum or maximum values, x- and y-intercepts, domain and range, given the function $f(x) = a(x - h)^2 + k$;
- rewrite $f(x) = ax^2 + bx + c$ as $f(x) = a(x - h)^2 + k$ by completing the square; and
- solve problems that can be modeled using quadratic equations including maximum and minimum problems.

While not required as core, the following outcomes will be covered in this course:

- solve quadratic equations having complex number solutions;
- solve quadratic inequalities by graphing;
- solve polynomial and rational inequalities algebraically;

9. Trigonometry
- label the sides of a right triangle with respect to a given angle;
- determine sine, cosine, and tangent ratios of an angle in a right triangle using the side lengths;
- use a scientific calculator to find the trigonometric value for a given angle and to find an angle given its trigonometric value;
- solve right triangles and applied problems using the basic trigonometric ratios, the Pythagorean theorem, and sum of the angles (180°); and
- use the Law of Sines and the Law of Cosines to solve non-right (oblique) triangles and applied problems.

COURSE TOPICS:

- Real Numbers and Algebraic Expressions
- Equations, Inequalities and Problem Solving
- Graphs and Functions
- Systems of Equations and Inequalities
- Polynomials and Polynomial Functions
- Rational Expressions
- Rational Exponents, Radicals and Complex Numbers
- Quadratic Equations and Functions
- Trigonometry

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

EVALUATION AND ASSESSMENT (Face-to-Face Delivery):

Assignments	% Of Total Grade
Assignments and Quizzes	30%
Unit Exams	30%
Final Exam	40%
Total	100%

EVALUATION AND ASSESSMENT (Directed Studies Delivery):

Assignments	% Of Total Grade
Chapter Tests	30%
Midterms	30%
Final Exam	40%
Total	100%

Please see the instructor's syllabus for specific classroom policies related to this course, such as details of evaluation, penalties for late assignments and use of electronic aids.

EXAM POLICY:

Students must attend all required scheduled exams that make up a final grade at the appointed time and place.

Individual instructors may accommodate for illness or personal crisis. Additional accommodation will not be made unless a written request is sent to and approved by the appropriate Department Head prior to the scheduled exam.

Any student who misses a scheduled exam without approval will be given a grade of "0" for the exam.

COURSE GRADE:

Course grades are assigned as follows:

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F
Mark (Percent)	≥ 95	94-90	89-85	84-80	79-75	74-70	69-65	64-60	59-55	54-50	< 50

A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

ACADEMIC POLICIES:

See www.cotr.bc.ca/policies for general college policies related to course activities, including grade appeals, cheating and plagiarism.

COURSE CHANGES:

Information contained in course outlines is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational, employment and marketing needs. The instructor will endeavour to provide notice of changes to students as soon as possible. The instructor reserves the right to add or delete material from courses.