



## MATH-080 – Mathematics – Advanced Level

### College Preparation and Upgrading

**Effective Term & Year:** Fall 2022

**Course Outline Review Date:** 2025-04-01

**Program Area:** Upgrading for Academic and Career Entry

#### 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 Methods:** On-campus (Face-to-Face), Directed/Guided Studies

**Credit Type:** ABE Credits

**Credits:** 0

#### Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	112.5
Seminar/Tutorials	
Laboratory/Studio	
Practicum/Field Experience	
Co-op/Work Experience	
Other	

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Total	112.5
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**Course Requisites:**

- Complete 1 of the following
  - Completed at least 1 of the following:
    - **MATH082** – Mathematics, Advanced Level (Developmental Mathematics)
    - **MATH070** – Mathematics Intermediate Level (Algebraic)
  - Or Foundations of Mathematics and Pre-Calculus 10 or equivalent.

**Flexible Assessment:** Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

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**Course Transfer Credit:**

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

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**Textbook 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 <https://textbook.cotr.bc.ca/> 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;
- 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 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 ;
- rewrite as 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 ( $180^\circ$ ); 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.

The outcomes of this course meet and are consistent with the outcomes prescribed for *Computer Studies: Fundamental Level in the Adult Basic Education in British Columbia Colleges – An Articulation Handbook –*

<https://www.bctransferguide.ca/wp-content/uploads/2022/08/abeguide2223.pdf>

## Evaluation and Assessments

### Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Assignments and Quizzes	30%
Unit Exams	30%
Final Exam	40%
Total	100%

### Assessment Type: Directed/Guided Studies

Assessment Type	% of Total Grade
Chapter Tests	30%
Midterms	30%

Final Exam	40%
Total	100%

## Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=95	94-90	89-85	84-80	79-75	74-70	69-65	64-60	59-55	54-50	<50

**Pass requirements:** None

**Evaluation Notes:** A grade of “D” grants credit, but may not be sufficient as a prerequisite for sequential courses.

### Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a “0” on the exam.

### Academic Policies:

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
- Policy 2.5.8 Academic Performance
- Policy 2.5.3 Grade Appeal
- Policy 2.4.9 Student Concerns Re Faculty

### Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.