

## Mathematics, Advanced Level (Developmental Mathematics) - MATH 082

### 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 the algebra and trigonometry to satisfy math requirements for some vocational, career and technical programs and/or further academic programs. Math 082 helps students build problem-solving skills and prepares students for entry into programs or courses requiring a Math 082 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:** Math 082 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         |
| <b>Total</b>                       | <b>112.5</b> |

#### Practicum Hours (if applicable):

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

Other Contact Hours:

- Guided Practice

**Course Outline Author or Contact:**

Deb Heal, BEd

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Signature

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**APPROVAL SIGNATURES:**

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Department Head Signature

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Dean Signature

EDCO

Valid from: September 2020 – March 2025

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Education Council Approval Date

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**COURSE PREREQUISITES AND TRANSFER CREDIT:**

**Prerequisites:** Either MATH 070, MATH 072, Foundations of Mathematics and Pre-Calculus 10 or equivalent.

**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

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## 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 and Directed Studies:

Martin-Gay, K. E. (2014). *Introductory Algebra*. (5<sup>th</sup> ed.) Prentice-Hall Inc.

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.

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## LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to

### 1. Operations with Real Numbers

- a) write fractions as decimals and repeating decimals as fractions;
- b) add, subtract, multiply and divide rational numbers;
- c) evaluate powers with rational bases and integer exponents;
- d) demonstrate the order of operations with rational numbers;
- e) evaluate radicals with rational radicands and distinguish between exact answers and approximate answers;
- f) simplify, add, subtract, multiply and divide square roots;

### 2. First Degree Equations and Inequalities

- a) solve first degree equations, in one variable, including those involving parentheses;
- b) solve formulas for a given variable when other variables are known;
- c) solve formulas for a given variable;
- d) solve first degree inequalities in one variable;
- e) solve practical problems that can be solved using a first degree equation;

### 3. Polynomials

- a) distinguish between monomials, binomials, trinomials and other polynomials (in one variable only);
- b) apply the laws of exponents to variable expressions with integral exponents;
- c) evaluate polynomials by substitution;
- d) add, subtract, and multiply polynomials;
- e) factor polynomials by removing the largest common factor;
- f) factor binomials of the form  $a^2x^2 - b^2y^2$  and trinomials of the form  $a^2 + bx + c$ ;
- g) solve quadratic equations using the law of zero products;
- h) (optional) factor trinomials of the form  $ax^2 + bx + c$ ;

#### 4. Rational Expressions

- a) simplify, by factoring, rational expressions consisting of polynomial numerators and either monomial, binomial, or trinomial denominators;
- b) determine values for which a rational expression is undefined;
- c) multiply and divide rational expressions;
- d) add and subtract rational expressions consisting of monomial and/or binomial denominators;
- e) solve simple rational equations and check solutions;

#### 5. Linear Equations

- a) graph a linear equation including the forms  $x = a$  and  $y = b$ ;
- b) given a linear equation or its graph, determine its
  - i. slope
  - ii. x- and y-intercepts
- c) determine the equation of a line,  $y = mx + b$ , given
  - i. its graph
  - ii. its slope and a point on the line
  - iii. two points on the line

#### 6. Systems of Linear Equations

- a) solve a system of first degree equations in two unknowns by graphing, substitution, and elimination methods;
- b) solve practical problems that can be solved using a system of equations;

#### 7. Radical Expressions

- a) simplify square roots with variable radicands;
- b) add, subtract, multiply and divide square roots with variable radicands;
- c) solve equations with one square root containing a polynomial radicand and check for extraneous solutions;

#### 8. Trigonometry

- a) solve right triangles using one or more of
  - i. the sine ratio
  - ii. the cosine ratio
  - iii. the tangent ratio
  - iv. the Pythagorean theorem
  - v. the angle sum property of triangles
- b) evaluate sine and cosine for angles from  $0^\circ$  to  $180^\circ$  (optional); and
- c) solve triangles using the Law of Cosines or the Law of Sines, excluding the ambiguous case (optional).

## 9. Optional Learning Outcomes

Students must complete one of the following three optional topics:

### A. The Quadratic Equation

- solve quadratic equations by factoring;
- solve equations of the form  $x^2 + bx + c = 0$  by completing the square;
- solve quadratic equations by using the quadratic formula;
- graph  $y = ax^2 + bx + c$  and determine its
  - x- and y-intercepts
  - vertex
- solve practical problems that can be solved using a quadratic equation;

### B. Statistics

- determine the mean, median, mode, range and standard deviation of a set of data;
- represent data graphically using broken line graphs and bar graphs;
- understand how the normal curve can be used to describe a normally distributed population;
- calculate z-scores and determine areas under the normal curve;
- use areas under the normal curve to analyze data in terms of the probability of various events;

### C. Financial Mathematics

- solve simple interest problems using the formula,  $i = prt$  (for any variable);
- solve compound interest problems for A or P using  $A = P \left(1 + \frac{r}{n}\right)^{nt}$  ;
- find the effective interest rate using  $E.R. = \left(1 + \frac{r}{n}\right)^n - 1$ ;
- solve annuity problems using  $A = \frac{nP \left[ \left(1 + \frac{r}{n}\right)^n - 1 \right]}{r}$  (for A or P only);
- find periodic payment using  $P = \frac{A \left(\frac{r}{n}\right)}{1 - \left(1 + \frac{r}{n}\right)^{-nt}}$  ;
- determine the finance charge on a loan; and
- determine the interest rate on a loan using tables or appropriate technology.

Material covered in this course is consistent with the articulated outcomes found in the 2017/2018 ABE BC Articulation Handbook. This handbook is available online at [www.bctransferguide.ca/search/abe](http://www.bctransferguide.ca/search/abe).

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### COURSE TOPICS:

- Fractions, Decimals & Percents
- Real Numbers
- Equations & Inequalities
- Exponents & Polynomials
- Factoring
- Rational Expressions
- Graphing Linear Equations

- Systems
- Roots & Radicals Quadratics
- Trigonometry

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

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

| Assignments                     | % Of Total Grade |
|---------------------------------|------------------|
| Unit Tests and/or Midterm Exams | 30%              |
| Unit Quizzes and Assignments    | 40%              |
| Final Exam (cumulative)         | <u>30%</u>       |
| Total                           | 100%             |

**EVALUATION AND ASSESSMENT (Directed Studies Delivery):**

| Assignments                     | % Of Total Grade |
|---------------------------------|------------------|
| Unit Tests and/or Midterm Exams | 30%              |
| Unit Quizzes                    | 40%              |
| Final Exam (cumulative)         | <u>30%</u>       |
| 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.

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**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.

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**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.

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**ACADEMIC POLICIES:**

See [www.cotr.bc.ca/policies](http://www.cotr.bc.ca/policies) for general college policies related to course activities, including grade appeals, cheating and plagiarism.

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**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.