

**School of University Study & Career Access Programs – Quesnel Campus
Academic Upgrading (ACDU)**

**MATH 045 – CI201
Advanced Algebraic Mathematics**

Approved by Education Council:	Credits: None
Term: Spring 2017	Total Course Hours: 112 hours
Prerequisite: Math 030 with a grade of “B+” or higher, Math 044, or “B+” or higher in Principles of Math 10, Foundations of Math and Pre-calculus 10 completed within the last year or as evaluated by an Academic Upgrading placement test.	Lecture Hours: 7.5 hours/week
Co-requisite: None	Lab Hours: None
Instructor: Elena Borsato	Office Hours: Monday, 3:00 – 4:00 Thursday, 2:00 – 3:00 or by appointment
Lecture: Monday, 10:30 – 12:30, N206 Tuesday, 10:30 – 12:30, N206 Wednesday, 10:30 – 12:30, N206 Thursday, 10:30 – 12:00, N206	Office: S226 Phone: 250.991.7500 extension 7611 e-mail: borsatoe@cnc.bc.ca
Lab: N/A	

CALENDAR DESCRIPTION:

This course includes a core of algebra; factoring; radicals; exponents; graphing; solving linear, simultaneous, and quadratic equations; formulas; functions; and trigonometry.

COURSE DESCRIPTION:

The course is structured using lectures and some group activities; some time is allotted for individual work in the classroom.

COURSE GOAL and LEARNING OUTCOMES:

The goals for Advanced Algebraic Mathematics are

- to provide students with sufficient mathematical knowledge for academic, career, and technical programs whose admission requirements include Math 11 equivalence and
- to prepare students to enter Provincial Level mathematics courses

The learning outcomes follow those of the *Adult Basic Education: A Guide to Upgrading in British Columbia's Post-Secondary Institutions. An Articulation Handbook* which are listed as follows:

- 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 and evaluate algebraic expressions by substitution
- simplify algebraic expression with nested parentheses
- solve first degree linear equations in one variable, solve simple formulas for a given variable, and 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 and solve and graph compound inequalities (conjunctions and disjunctions)
- solve absolute value equations
- write linear equations in slope-intercept form
- graph linear equations and non-linear equations using a table of values, y-intercept and slope, and x- and y- intercepts; graph horizontal and vertical lines
- find the slope of a line given two points on the line; and 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; and 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
- graph linear functions and non-linear functions such as quadratic, cubic, square root, reciprocal, and absolute value functions
- graph linear inequalities in two variables
- 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; use systems of equations to solve applied problems
- determine the degree of a polynomial and distinguish between monomials, binomials, trinomials, and other polynomials
- add, subtract, multiply polynomials and divide polynomials by monomials
- factor 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, grouping (and x-multiplication)
- solve polynomial equations using the principle of zero products; and solve applied problems using polynomial equations/functions
- identify situations and find values for which a rational expression will be undefined
- simplify rational expressions; and 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 modelled 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
- write radicals as powers with rational exponents and vice versa
- use rational exponents to simplify radical expressions; and simplify, add, subtract, multiply, and divide radical expressions
- rationalize denominators in fractional expressions containing radicals
- 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
- solve applied problems which can be modelled by radical equations, and determine if solutions are reasonable given the context of the problem
- solve quadratic equations by factoring, principle of square roots, completing the square, and the quadratic formula
- use the discriminant to identify the number and type of solutions of a quadratic equation
- write a quadratic equation given its solution

- 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
- solve problems that can be modelled using quadratic equations including maximum and minimum problems
- 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 the sum of the angles (180°)
- use the Law of Sines and the Law of Cosines to solve non-right triangles and applied problems

This course meets the outcomes as listed above and in the Articulation Handbook found at www.aved.gov.bc.ca/abe

ACADEMIC HONESTY AND STUDENT CONDUCT:

Students are expected to conduct themselves with academic integrity and in accordance with CNC's established standards of conduct. Penalties for misconduct, including plagiarism, cheating and personal misconduct are outlined in the *Standards of Conduct: Student Responsibility and Accountability* document found in the policies section of CNC's website. All students should familiarize themselves with this document. http://cnc.bc.ca/Visiting/CNC_Policies.htm

ACCESSIBILITY SERVICES:

Students who require academic accommodations as a result of a disability should advise both the instructor and Accessibility Services. Students requiring support should familiarize themselves with the College Access: Students with Disabilities policy. http://cnc.bc.ca/Visiting/CNC_Policies.htm

REQUIRED REFERENCES:

All required texts may be borrowed from the library:

Intermediate Algebra, 11th edition, Marvin L. Bittinger, Boston: Pearson Education, 2011
Student's Solution Manual, Judith A. Penna, Boston: Pearson Education, 2011
Introductory Trigonometry, Gordon B. Rudolph, Vancouver: VCC Press, 1993

EVALUATION METHODS AND % OF TOTAL GRADE:

STUDENT EVALUATION		LETTER GRADE / PERCENTAGES	
Class Assignments, Quizzes, Participation	5%	A+	90 % - 100 %
8 Unit Tests @ 5% each	40%	A	85 % - 89.9 %
1 Take Home + 1 Open Book Test @ 2.5% each	5%	A-	80 % - 84.9 %
Midterm Test	20%	B+	76 % - 79.9 %
Final Exam	30%	B	72 % - 75.9 %
Students who receive less than 50% on the Final Exam will not receive a grade higher than “C-.” To enrol in Math 050, you must have achieved a “C” in Math 045.		B-	68 % - 71.9 %
		C+	64 % - 67.9%
		C	60 % - 63.9%
		C-	55 % - 59.9%
		D	50 % - 54.9%
		F	0 % - 49.9%

COURSE TOPICS – WEEKLY SCHEDULE

Week	Dates	Topics/Exams/Important Dates
1	Jan 1 – 7	<i>January 2 – College Closed</i> Unit R: Review of Basic Algebra – real numbers, exponential notation, algebraic expressions, scientific notation
2	Jan 8 – 14	January 10 – Unit R Take Home Exam Due Unit 1: Solving Linear Equations and Inequalities – formulas, problem solving, sets, inequalities, interval notation, intersections, union, compound inequalities, absolute value equations & inequalities
3	Jan 15 – 21	January 16 – Unit 1 Exam Unit 2: Graphs, Functions, and Applications – graphs of equations, functions, domain and range, linear functions – graphs and slopes
4	Jan 22 – 28	Unit 2 cont'd: graphing linear equations, finding equations of lines, applications January 24 – Unit 2 Exam Unit 3: Systems of Equations – Two variables, solving by substitution and elimination
5	Jan 29 – Feb 4	Unit 3 cont'd: solving applied problems with two equations, systems of equations in three variables, systems of inequalities in two variables February 1 – Unit 3 Exam

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| 6 | Feb 5 – 11 | Unit 4: Polynomial and Polynomial Functions – addition, subtraction, multiplication of polynomials, factoring (including highest common factor, $x^2 + bx + c$; $ax^2 + bx + c$, trinomial squares, differences of squares, sum of cubes, differences of cubes), and applications |
| 7 | Feb 12 – 18 | <i>February 13 – Family Day – College is Closed</i>
February 14 – Unit 4 Exam
Midterm Review
February 16 – MIDTERM – the midterm is comprehensive – Units R – 4 inclusive |
| | Feb 19 – 25 | Reading Break – College Open – No Classes Scheduled |
| 8 | Feb 26 – Mar 4 | Unit 5: Rational Expressions, Equations, and Functions – multiplying dividing & simplifying, LCMs, LCDs, addition & subtraction, complex rational expressions, solving rational equations, applications & proportions, formulas & applications, variation & applications |
| 9 | Mar 5 – 11 | March 8 – Unit 5 Exam
Unit 6: Radical Expressions, Equations, and Functions – rational umbers as exponents, simplifying radical expressions |
| 10 | Mar 12 – 18 | Unit 6 cont'd: addition, subtraction & multiplication of radical expressions, division of radical expression, solving radical equations, applications involving powers & roots, complex numbers |
| 11 | Mar 19 – 25 | March 20 – Unit 6 Exam
Unit 7: Quadratic Equations and Functions – completing the square, solving using quadratic formula, applications involving quadratic equations, discriminant, writing equations using solutions, and solving equations quadratic in form |
| 12 | Mar 26 – Apr 1 | Unit 7 cont'd: graphing quadratic equations, finding x- and y-intercepts, mathematical modeling with quadratic functions
March 29 – Unit 7 Exam |
| 13 | Apr 2 – 8 | Unit Trigonometry: Pythagorean Theorem, trigonometric ratios, solving right triangles – applications, Law of Sines, Law of Cosines, solving oblique triangles & applications
April 5 – Unit Trig Exam |
| 14 | Apr 9 – 15 | Unit 8: Inverse functions and composite functions; algebra of functions; Unit 9: Parabolas & circles; distance & midpoint formulas; equations of circles; nonlinear systems of equations & applied problems
April 11 – Unit 8/9 – Open Book Exam
Final Exam Review |
| 15 | Apr 16 – 22 | <i>Final Exam Week – No Regularly Scheduled Classes</i>
Final Exam is a comprehensive exam – 83.3% of the final exam covers material since the Midterm |