CLARKSON SECONDARY SCHOOL

Course Code: MHF 4U0

Course Name: Advanced Functions
Grade 12 University

***Prerequisite*:**

MCR3U0
Functions and Applications Grade 11 University

MCT4C0
Mathematics for College Technology Grade 12

Material Required:
Advanced Functions Nelson

Textbook Replacement Cost: $100

Course Description

This course extends students' experience with functions. Students will investigate the properties of polynomial, rational, logarithmic, and trigonometric functions; develop techniques for combining functions; broaden their understanding of rates of change; and develop facility in applying these concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. This course is intended both for students taking the Calculus and Vectors course as a prerequisite for a university program and for those wishing to consolidate their understanding of mathematics before proceeding to any one of a variety of university programs.

Overall Course Expectations

By the end of this course the students will

Exponential and Logarithmic Functions

1. demonstrate an understanding of the relationship between exponential expressions and logarithmic expressions, evaluate logarithms, and apply the laws of logarithms to simplify numeric expressions;
2. identify and describe some key features of the graphs of logarithmic functions, make connections among the numeric, graphical, and algebraic representations of logarithmic functions, and solve related problems graphically;
3. solve exponential and simple logarithmic equations in one variable algebraically, including those in problems arising from real-world applications.

Trigonometric Functions

1. demonstrate an understanding of the meaning and application of radian measure;
2. make connections between trigonometric ratios and the graphical and algebraic representations of the corresponding trigonometric functions and between trigonometric functions and their reciprocals, and use these connections to solve problems;
3. solve problems involving trigonometric equations and prove trigonometric identities.

Polynomial and Rational Functions

1. identify and describe some key features of polynomial functions, and make connections between the numeric, graphical, and algebraic representations of polynomial functions;
2. identify and describe some key features of the graphs of rational functions, and represent rational functions graphically;
3. solve problems involving polynomial and simple rational equations graphically and algebraically;
4. demonstrate an understanding of solving polynomial and simple rational inequalities.

Characteristics of Functions

1. demonstrate an understanding of average and instantaneous rate of change, and determine, numerically and graphically, and interpret the average rate of change of a function over a given interval and the instantaneous rate of change of a function at a given point;
2. determine functions that result from the addition, subtraction, multiplication, and division of two functions and from the composition of two functions, describe some properties of the resulting functions, and solve related problems;
3. compare the characteristics of functions, and solve problems by modelling and reasoning with functions, including problems with solutions that are not accessible by standard algebraic techniques.

ASSESSMENT BREAKDOWN INCLUDING CATEGORIES AND WEIGHTINGS.

Formative assessments are learning practices that provide important feedback to student progress and include homework checks, exit tickets, self assessments to name a few.

Summative assessments form the foundation for final mark allocation at the end of a unit, term and exam.

CATEGORIES	% WEIGHT OF FINAL GRADE
Knowledge	25
Application	25
Thinking	10
Communication	10
Final Examination	30
TOTAL	**100**

Unit	Unit Breakdown	Assessments
Exponential and Logarithmic Functions	Exploring the Logarithmic Function; Transformations of Logarithmic Functions; Evaluating and Laws of Logarithms, Solving Exponential and Logarithmic Functions, Solving Problems with Logarithmic and Exponential Functions; Rates of Change in Logarithmic and Exponential Functions.	Unit Quizzes & Tests
Trigonometric Functions	Radian Measure and Angles on the Cartesian Plane; Graphs of the 6 major Trig. Functions; Transformations, Modeling with, and Rates of Change in Trigonometric Functions. Exploring Equivalent Trigonometric Functions; Compound and Double Angle Formulas; Proving Trigonometric Identities; Solving Linear and Quadratic Linear Equations.	Unit Quizzes & Tests
Polynomial and Rational Functions	Exploring and Characteristics of Polynomial Functions both in factored and non-factored form; Transformations of Cubic and Quartic Functions; Dividing and Factoring Polynomials; Factoring a Sum or Difference of Cubes Solving Polynomial Equations; Solving Linear Inequalities; Solving Polynomial Inequalities; Rates of Change in Polynomial Functions Graphs of Reciprocal Functions; Exploring Quotients of Polynomial Functions; Graphs of Rational Functions with a linear numerator and denominator; Solving Rational Equations and Inequalities; Rates of change in Rational Functions	Unit Quizzes & Tests
Characteristics of Functions	Domain and Range; Absolute Value; Properties of Graphs of Functions; Sketching Graphs of Functions; Inverse Relations; Piecewise Functions; Exploring Operations (sum, difference and product) with Functions Determining Average Rate of Change; Estimating Instantaneous Rates of Change from Tables of Values and Equations; Exploring Instantaneous Rates of Change Using Graphs; Using Rates of Change to Create a Graphical Model; Solving Problems involving Rates of Change Exploring Combinations of Functions; Combing Two Functions: Sums, Differences and Products; Quotients of Functions; Composition of Functions; Solving Equations and Inequalities; Modeling with Functions.	Unit Quizzes & Tests

LEARNING SKILLS Learning Skills will be reported on the student's report card. The following chart indicates the skills and look-fors for each student.

WORKS INDEPENDENTLY	TEAMWORK	ORGANIZATION	WORK HABITS/HOMEWORK	INITIATIVE	SELF-REGULATION
The student: ▪ accomplishes tasks independently ▪ accepts responsibility for accomplishing tasks ▪ follows instructions ▪ regularly completes assignments on time and with care ▪ uses time effectively	**The student:** ▪ works willingly and cooperatively with others ▪ listens attentively, without interrupting ▪ takes responsibility for his/her share of the work to be done ▪ helps to motivate others, encouraging them to participate ▪ shows respect for the ideas and opinions of others	**The student:** ▪ organizes work when faced with a number of tasks ▪ devises and follows a coherent plan to complete a task ▪ demonstrates ability to organize and manage information ▪ follows an effective process for inquiry and research	**The student:** ▪ completes homework on time and with care ▪ follows directions ▪ shows attention to detail ▪ perseveres with complex projects that require sustained effort ▪ applies effective study practices	**The student:** ▪ seeks out new opportunities for learning ▪ seeks necessary and additional information ▪ requires little prompting to complete a task, ▪ approaches new learning situations with confidence and a positive attitude ▪ seeks assistance when needed	**The student:** ▪ sets individual goals and monitors own progress ▪ seeks clarification or assistance when needed ▪ reflects and assesses critically own strengths, needs and interests ▪ perseveres and makes an effort when responding to challenges

Additional Information:

- Students are reminded to have a scientific calculator, graphing paper and other appropriate materials for the course.
- Additional help is available through your teacher.
- Access to the Ontario Educational Resource Bank (OERB) is at http://resources.elearningontario.ca/
  The login for use by the Peel District School Board's students is
  Student Login: pdsbstudent
  Student Password: oerbs
- Visit http://www.khanacademy.org/ for mini lessons on topics covered in class.
- Mathematics Contests for students in Grade 12:
  - Canadian Senior and Intermediate Math Contests: register in the first week of October; contest written in November
  - Euclid Contest : register during the first week in March; contest written in April.

  Visit www.cemc.uwaterloo.ca for additional details.

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Parent/Guardian Signature **Student Signature** **Date**

Clarkson S.S. Assessment & Evaluation Policy

CHEATING:

Students are expected to demonstrate **HONESTY** and integrity and submit assessments that are reflective of their own work. Cheating is defined as completing an assessment in a dishonest way through improper access to the answers. Examples include, but are not limited to; using another student's work as your own, using an unauthorized reference sheet during an assessment, receiving / sending an electronic message to another student with test questions / answers, etc.

In order to ensure that all assessments are free from cheating,

Students will:
• review school policy with regards to academic honesty • submit their own work for evaluation to show evidence of skill and knowledge • use only teacher approved materials during an evaluation • demonstrate the qualities of good character and good intention (honesty, caring, respectful, responsibility,) when preparing evidence of their learning.

If a student cheats on an assessment,

Students may be:
• required to complete an alternate evaluation under direct supervision in a timely manner • required to write a reflective piece which demonstrates an understanding of the character attribute of honesty. • assigned a mark deduction • referred to a vice-principal • assigned a zero.

Plagiarism:

Students are expected to demonstrate **HONESTY** and use proper citations and referencing when completing assessments. Plagiarism is defined as the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work. Examples include, but are not limited to; copying another's project (portions or whole) and paraphrasing parts of a book or article without reference or citation.

In order to ensure that all assessments are free from plagiarism,

Students will:
• Be required to complete a workshop in correct documentation • produce their own work • give credit through appropriate citations and referencing when quoting or paraphrasing the work of others • be diligent in maintaining and protecting their own work • seek clarification or assistance from teachers or other available resources

If an assessment is plagiarized,

Students may be:
• required to rewrite or resubmit all or parts of the assignment • referred for remedial lessons on proper citation and references • required to do a reflection on the character attribute of honesty • referred to a vice-principal • required to sign a contract with the administration and teacher about commitment to academic honesty • assigned a zero.

LATE ASSIGNMENTS – assignments submitted after the due date and before the absolute deadline.

Students are expected to demonstrate **RESPONSIBILITY** and submit all assessments by the established due date. Students are responsible for providing evidence of their achievement of the overall course expectations within the time frame specified by the teacher and in a form approved by the teacher. There are consequences for not completing assignments for evaluation or for submitting those assignments late.

In order to ensure that all evaluations are submitted by the established due date,

Students will:
• record due dates in personal organizers • consider other commitments including co-curricular activities in planning assignment completion • negotiate alternate due date well before due date, not last minute (a minimum of 24 hours in advance or at teachers discretion) • find out what they missed during absences • use school support systems (i.e. special education, counselors, extra help, …)

If an evaluation is submitted **after** the due date

Students :
• must notify the teacher and explain why the assignment was not submitted on the due date – in grades 9 & 10 a note from a parent/guardian may be required • marks may be deducted for late assignments • may be required to complete the assignment with supervision • may be referred to a school based support team or a vice-principal • may be placed on a contract for assignment completion

MISSED ASSIGNMENTS – assignments either not submitted or submitted after the absolute deadline

Excerpt from Policy 14.

In order to ensure that all evaluations are submitted,

Students will:
• be responsible for meeting and knowing absolute deadlines for missed assignments • use personal organizers to manage time and meet deadlines • be responsible for maintaining on- going communication with their teacher • take responsibility for missed work during all absences.

If an evaluation is submitted **after** the **absolute** deadline,

Students:
• must notify the teacher and explain why the assignment was not submitted • students may be asked to provide a note from a parent/guardian • may be required to complete the assignment or an alternate assignment under supervision • may be referred to a school based support team or a vice-principal • may be placed on a contract for assignment completion • may be involved in an action plan to complete the required assignment within a given time frame • may be assigned a zero.

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