Advanced Functions 12 (MHF4U)

2019-2020

Teacher	Email	Website	Office Hours
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General Information

Description

This course is intended to extend your understanding, knowledge, and application of functions. We will cover what functions are, polynomials, exponents, logarithms, trigonometry, rational functions, and finishing off with an introduction to proofs and vectors.

Expectations and Goals

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;
- solving polynomial and simple rational inequalities;
- the relationship between exponential expressions and logarithmic expressions, evaluate logarithms, and apply the laws of logarithms to simplify numeric expressions.

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.

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;
- 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.

Identify and describe:

- some key features of polynomial functions, and make connections between the numeric, graphical, and algebraic representations of polynomial functions;
- some key features of the graphs of rational functions, and represent rational functions graphically;
- 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.

Solve:

- problems involving polynomial and simple rational equations graphically and algebraically;
- problems involving trigonometric equations and prove trigonometric identities;
- exponential and simple logarithmic equations in one variable algebraically, including those in problems arising from real-world applications.

Course Materials

Required Materials

For each class, it is recommended to have:

• Exercise, binder with loose leaf, etc. for writing on and keeping all of your notes and materials in

• Pen or pencil, something to write with

• Textbook currently being referenced

• Calculator with trigonometric, logarithmic, and exponential capabilities (ie. Any scientific calculator)

• Graphing technology (ie. Graphing calculator, wxMaxima, Mathematica, Python, Matlab, Maple, etc)

Required Text

Nelson Advanced Functions Textbook, B. Alldred, C. Chilvers, B. Farahani, K. Farentino, A. Lillo, I. Macpherherson, J. Rodger, S. Trew; **Geometry and Discrete Mathematics** Textbook, B. Alexander

Course Schedule

We will aim to cover a chapter subsection (ex. Ch. 1.1) in one class, which will typically include taking notes, board-worked examples, individual sample problems, and group sample problems. Each chapter will have 2 small individual assignments (midway and at the end), review in class, and a chapter test. The below schedule is our target for time management, and leaves ~2 classes each term free. If these free classes are not taken up by unexpected school closures (ex. Snow days), we can use these as additional review classes or as exploratory classes at the end of the year, depending on interest.

Note that notes and supplementary material will be made available on my website (www.cita.utoronto.ca/~woodford) several days before we cover the material. Please take the time to read the relevant textbook subchapter and/or online notes before coming to class.

Book & Chapter	Topic	Term & classes
Nelson Adv. Functions, Ch.3 (-3.4)	Polynomial Functions	Term 1, 8 classes
Nelson Adv. Functions, Ch.4 (-4.4)	Polynomial Equations and Inequalities	Term 1, 5 classes
Nelson Adv. Functions, Ch.1 (+3.4)	Function Characteristics and Properties	Term 1, 10 classes
Nelson Adv. Functions, Ch.2 (+4.4)	Rates of Change	Term 1, 8 classes
Nelson Adv. Functions, Ch.5: 5.1-5.3	Rational Functions, Equations, and Inequalities (Part I)	Term 1, 4 classes
Nelson Adv. Functions, Ch.5: 5.4-5.6	Rational Functions, Equations, and Inequalities (Part II)	Term 2, 4 classes
Nelson Adv. Functions, Ch.6	Trigonometric Functions	Term 2, 9 classes
Nelson Adv. Functions, Ch.7	Trigonometric Identities and Equations	Term 2, 8 classes
Nelson Adv. Functions, Ch.8	Exponential and Logarithmic Functions	Term 2, 10 classes
Nelson Adv. Functions, Ch.9	Combinations of Functions	Term 3, 9 classes
Geometry and Discrete Math, Ch.1	Introduction to proof	Term 3, 6 classes
Geometry and Discrete Math, Ch.3	Properties of a circle	Term 3, 7 classes
Geometry and Discrete Math, Ch.4	Vectors	Term 3, 6 classes

Marking Scheme

Component	Grade Value
Assignments (est. 24)	30%
In-class work (group and individual), conversation	15%
Chapter Tests (est. 12)	25%
Final Exam (June)	30%

Assignments will be due within the first 15 minutes of class, and will be considered late otherwise. The penalty for lateness is 15% per day.

Test corrections may be submitted within 1 week of a test being passed back for up to 1/3 of the lost marks added back onto the final test mark.