

Sir Wilfrid Laurier Secondary School

Grade 12 Advanced Functions – MHF 4U

1.0 credits

Course Outline

Course Description

This course extends students' experience with functions. Students will investigate the properties of polynomial, rational, logarithmic, and trigonometric 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 who plan to study mathematics in university and for those wishing to consolidate their understanding of mathematics before proceeding to any one of a variety of university programs.

Prerequisite: Functions, Grade 11, University Preparation, or Mathematics for College Technology, Grade 12, College Preparation

Strands and Subgroups

Exponential and Logarithmic Functions

- demonstrate an understanding of the relationship between exponential expressions and logarithmic expressions, evaluate logarithms, and apply the laws of logarithms to simplify numeric expressions;
- 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;
- solve exponential and simple logarithmic equations in one variable algebraically, including those in problems arising from real-world applications.

Polynomial and Rational Functions

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

Trigonometric Functions

- demonstrate an understanding of the meaning and application of radian measure;
- 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;
- solve problems involving trigonometric equations and prove trigonometric identities.

Characteristics of Functions

- 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;
- 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.

Evaluation

The final report card mark will be determined as follows:

Term Mark	70% of final grade
Summative & Final Exam	30% of final grade

The student demonstrates, in all of the overall expectations, specified knowledge and skills with:

a high degree of effectiveness	Level 4 (80-100)	Achievement surpasses the provincial standard.
considerable effectiveness	Level 3 (70-79)	Achievement represents the provincial standard .
some effectiveness	Level 2 (60-69)	Achievement is approaching provincial standard.
limited effectiveness	Level 1 (50-59)	Achievement falls much below the provincial standard.
	Below Level 1 (49 and below)	*Student does not achieve at least <i>limited effectiveness</i> in <u>all</u> overall expectations.

Guidelines for Missed Evaluations and Academic Fraud

1. Upon missing a test or presentation, students will be required at the teacher's discretion, either to:
 - a) Complete the test or presentation immediately upon return to school; or
 - b) Make arrangements with the teacher for a make-up; or
 - c) Write the missed test on a morning at 7:15 a.m. of that week with the administration.

Failure to complete the missed test/presentation according to the negotiated schedule will result in a mark of zero.

Note: Certain forms of formal summative evaluations (exams, summative project presentations or tasks, etc.) are time sensitive. This means they must be completed at and within a specific time. Students must be present and prepared for these summative evaluations. Any absence will result in a mark of **zero**, unless validated by an official certificate. (ex. Medical Certificate).

2. If an assignment is late or incomplete, a student will be provided with a second opportunity. Students who are provided with a second opportunity, **shall complete the required assignment within five school days**. If no evidence is forthcoming after five days, a mark of zero will be assigned.
3. Copied, borrowed or stolen work provides no evidence of learning. Teacher will document and archive the work in question. Students may be allowed to resubmit the assignment. The teacher and administrator will define the parameters for the completion of this task.

General Course Information

Students must bring the following materials to each class:

- separate Math binder (to hold notes, tests, quizzes, handouts)
- pencil case (to hold pencils, erasers, ruler)
- scientific calculator
- lined and graph papers

*The text for the course is **Advanced Functions**, Nelson (\$98.18 GST included). The student will be issued a text, and will be responsible for the cost of replacement, or repair, if the text is lost or damaged.*

Graphing Calculators

Calculators with graphing technology are permitted for some evaluations, and are of great assistance for homework. Students without a handheld model can access online versions at home:

1. For both 2D and 3D graphing: <https://www.desmos.com/calculator>
 2. iPod Touch, iPad, iPhone, Tablets etc.:
 - Apps updated frequently
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