Earl of March Secondary School
Advanced Functions, Grade 12, University Preparation (MHF4U)
Revised: March 2021

Course Description:
This course is designed primarily for students with a credit in Functions, Grade 11, University Preparation (MCR3U) although other pathways are possible. 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.

Curriculum: The major strands and the overall expectations for the course are summarized below.
To learn more about the curriculum follow this link.
By the end of the course students will. . .
A. **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.
B. **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.
C. **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.
D. **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.

Earl of March Homework Policy - Helping Learning "Stick"
Learning requires a sincere commitment to work and study. Choosing to do homework is an essential part of a student's educational development. Homework helps students improve their academic and study skills, and is critical in the reinforcement of ideas and concepts presented in class. Also, homework helps students develop responsibility, independence, perseverance, time management skills and curiosity. The Ontario Curriculum emphasizes that there is a direct relationship between effort and student achievement. Homework will be assigned to students based upon reasonable expectations, and with the understanding that many students are involved in a variety of worthwhile activities outside of the school setting.

Textbook: Nelson Advanced Functions

Assessment Strategies

A variety of teaching/assessment strategies to address students' needs will be used during this course. Formative assessments will be ongoing throughout the academic year and students will receive descriptive feedback intended to help them improve their learning. The chart below outlines achievement levels with some quality descriptors. Levels will be used when assigning marks in this course.

Level	Descriptors
R: not a passable level of achievement	Insufficient demonstration of understanding
1: much below the provincial standard	Limited understanding, weak, lacking purpose
2: approaching the provincial standard	Some understanding, simplistic, somewhat purposeful
3: the provincial standard	Considerable understanding, solid, standard, purposeful, effective
4: surpassing the provincial standard	Consistent, thorough understanding, in depth, insightful to a purpose, efficient

Evidence of Student Achievement

Students may demonstrate their understanding of the course material in a wide variety of ways. Evidence of student achievement may come from observations, conversations, and students products. Student products may include tests, assignments, performance tasks, and examinations. A balanced combination of a student's Knowledge and Understanding, Thinking, Communication, and Application will be assessed. These 4 categories will not be separately evaluated. Instead, they will be *"considered as interrelated, reflecting the wholeness and interconnectedness of learning." – from the Ontario Ministry of Education curriculum documents.*

Source of Evidence		Description
	Observations	The teacher may record evidence of student achievement observed as students work on investigations in class.
	Conversations	The teacher may record evidence of student achievement elicited during a conversation with a student
P r o d u c t s	Tests	There will be major unit tests.
	Assignments	Students may complete in-class assignments.
	Tasks	Students may demonstrate their creativity, knowledge and understanding of the material through in-class performance tasks.
	Summative Task	Students will show evidence of their learning by performing a task in class that will include many overall expectations of the course.
	Final Examination	There will be a final examination during exam week at the end of the semester.

How Can Parents Help?

First of all, don't panic if you have forgotten your high school math. You can support your children's learning without teaching them. Having a positive attitude towards learning in general and mathematics in particular can go a long way. Consider also that teenagers are often unaware that the pathway to "success" is rarely a straight line; sharing your own personal experiences of frustration and struggle, perseverance and accomplishment may help your child see his or her own experiences in a new way. Thirdly, why not take a look at some of the sites below and see what you think; the internet is full of resources!

1. This Ontario Ministry of Education Student Success page provides links for parents, students, teachers and employers.
2. This PowerPoint presentation is designed for parents of students of all ages. Many ideas, questions and links are provided although not all are focussed on secondary education.
3. This link will take you to information from York University on Critical Thinking Skills.
4. Students may wish to challenge themselves further by writing math contests offered through the University of Waterloo CEMC.

If you have any questions, please feel free to contact your child's teacher.