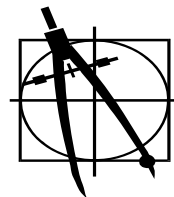




DEPARTMENT OF MATHEMATICS

John Cabot Catholic Secondary School



Course Code: MHF 4U1 – 01, 02
Course Name: Advanced Functions
Level: University

Instructor: Mr. A. Cecchini
Period: 1, 3bc
Room Number: Room 317/325

Course Overview

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 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 a variety of university programs.

Specific Strands of Study and Expectations include:

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 features of the graphs of logarithmic functions, make connections between 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 arising from real-world applications.

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.

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 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.

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

Course Breakdown (approximate timelines)

Unit 1	Polynomials & Rational Functions	11 days
Unit 2	Rational Functions	14 days
Unit 3	Equations and Inequalities	17 days
Unit 4	Exponential & Logarithmic Functions	14 days
Unit 5	Trigonometric Functions	15 days
Unit 6	Consolidation of Function Characteristics (investigations, modeling, task and assignments)	15 days

Resources:

- Mathematics 11 (McGraw-Hill Ryerson 2001)
- Mathematics 12 (Addison-Wesley 1988)
- Advanced Functions and Calculus (Addison-Wesley 2003)
- Advanced functions and Intro Calculus (Harcourt 2002)
- Relations (Gage Publishing 1979)
- Worked examples in Calculus (Tam 2000)
- Peter D. Taylor Questions in Advanced functions (2007)
- Catholic & Public Board Course Profile
- Texas Instruments Graphing Calculator (TI-83 plus)
- Geometers Sketchpad and MS Excel
- Various other reference Textbooks and worksheets and computer software programs

Evaluation Structure:

Knowledge/Understanding	30%
Thinking/Inquiry	20%
Communication	20%
Application	30%

The above is reflected both in the term work (worth 70% of the final mark) and the Final Exam (worth 30% of the final mark).

Evaluation Policy

Students will be assessed & evaluated according to the work produced & skills displayed. Methods of providing feedback will include assessing work in process & evaluating completed assignments, tests, co-operative learning activities, simulations and presentations. Peer & self-evaluations will also be utilized.

Student marks will be determined by evaluating process & product according to 4 categories & 4 levels. Please see the chart below for specific skills and key words used to determine student competency in the different categories.

Level	Level 1: 50-59%	Level 2: 60-69%	Level 3: 70-79%	Level 4: 80-100%
Category				
Knowledge/Understanding • Knowledge of facts & terms • Understanding of concepts & relationships	-Limited display of knowledge, skills and ability to apply concepts	-Some success in displaying knowledge, skills and application of concepts	-Considerable display of knowledge skills and ability to apply concepts	-Thorough understanding of concepts and ability to communicate, think creatively and apply concepts
Thinking/Inquiry • Critical thinking skills • Multiple problem solving skills • Inquiry Skills				
Communication • Communication of ideas and information • Use of symbols & visuals • Oral & written communication				
Application • Applications in familiar contexts • Transfer of concepts to new contexts • Making logical conclusions and predictions • Use of technology • Making connections				

Feedback will also be provided for student learning skills. Skills like working independently, team work, organization, work habits and homework, and initiative are assessed independently student achievement and will be conducted through the use of a rubric indicating specific criteria to be achieved to receive each of the following letter grades:

E –Excellent

G – Good

S – Satisfactory

N - Needs Improvement

Other Evaluation Issues

- **LATE ASSIGNMENTS.** Assignments submitted after the *Primary Due Date* established by the teacher will be accepted with a penalty of 5% off for the first day late and 2% for subsequent days to a maximum of 10%. This four day *Penalty Zone* is the maximum time allowed for submissions. The fourth day after the assignment is due is considered the *Closure Date* upon which no further assignments will be accepted. If the teacher returns the marked assignments within the four day penalty zone, the date of return is considered the closure date. Repeated lateness in submissions indicates poor organization skills and may result in parental contact and will be reflected in the learning skills section of the report card.
- **INCOMPLETE ASSIGNMENTS** Assignments will be graded according to the extent with which they meet the criteria established in the rubric or evaluation structure.
- **MISSED TESTS** A test missed with a legitimate reason will be written within a few days of the student returning from the absence. Student eligibility to write the test and the date of writing will be at the discretion of the teacher in consultation with the department head.
- **CULMINATING ACTIVITIES** These activities will be due toward the end of the course. They are valued up to 15 per cent of the final mark and will reflect course material and competencies not otherwise reflected on the final exam.
- Plagiarism in any form reflects academic dishonesty and will result in a mark of zero for the assignment in question