

THE UNIVERSITY OF THE WEST INDIES, MONA

ECON1003: Mathematics for Social Sciences I

Semesters I & II

Pre-requisites: CXC Math Grade III (pre 1998) or O'Level Math Grade C or ECON0001

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COURSE DESCRIPTION:

This course is designed to build on students' understanding of elementary mathematics and to expose them to some of the mathematical concepts that will be useful in the study of mathematical models in economics and the management sciences.

Emphasis will be placed on the understanding and application of mathematical concepts, rather than just computational skills and the use of algorithms and formulas.

The course is aimed at:

- Developing the mathematical skills needed to successfully navigate the seas of quantitative courses in economics and management studies.
- Developing an appreciation for the beauty and power of mathematics.

LEARNING OUTCOME:

At the end of the course students will be able to use mathematical concepts and skills to solve problems in economics and management sciences.

MODE OF DELIVERY

One two – hour online lecture and one online tutorial hour per week.

COURSE ASSESSMENT

1. Midterm I (20 MCQ) – 25%
2. Midterm II (20 MCQ) – 25%
3. Final Examination (20 MCQ) – 50%

SYLLABUS

PRE CALCULUS

1. Functions

- 1.1 Definition of a function
- 1.2 Evaluating functions
- 1.3 Domain, range and graphs of functions
- 1.4 One to one and onto functions
- 1.5 Composition of functions
- 1.6 Inverse functions and their graphs
- 1.7 Special functions and their graphs (polynomial, rational, absolute value, square root)
- 1.8 Transforming graphs (horizontal and vertical shifts, reflection)

2. Inequalities

- 2.1 Linear inequalities including absolute value and double inequalities
- 2.2 Solving quadratic inequalities graphically
- 2.3 Graphs of systems of linear inequalities
- 2.4 Applications of inequalities (profit, sales allocation, investment)

3. Equations

- 3.1 Brief review of linear and quadratic equations
- 3.2 Cubic equations – Remainder and Factor Theorems
- 3.3 Nonlinear equations to include radicals and absolute value
- 3.4 Manipulation of formulas

4. Exponential and Logarithmic Functions

- 4.1 Graphs of exponential and logarithmic function
- 4.2 The natural exponential and natural logarithmic function
- 4.3 Basic properties of logarithmic
- 4.4 Solving exponential equations
- 4.5 Applications

5. Determinants

- 5.1 (2×2) and (3×3) determinants
- 5.2 Cramer's rule

6. Sequences

- 6.1 Definition of a sequence (general terms and recursive definition)
- 6.2 Sigma notation, including double sums

CALCULUS

7. Limits & Continuity

- 7.1 Concept of a Limit
- 7.2 Limits of Polynomial and Rational Functions including limits to infinity
- 7.3 One-Sided Limits
- 7.4 Distinguish between Continuous and Discontinuous Functions
- 7.5 Finding points of discontinuity of Rational Functions

8. Differentiation of Single Variable Functions

- 8.1 The concept of the derivative
- 8.2 Rules of differentiation (power, chain, product, quotient rules)
- 8.3 Higher order derivatives
- 8.4 Differentiation of Exponential and Logarithmic Functions
- 8.5 Marginal functions
- 8.6 Relative extrema (maxima/minima) using the first and second derivative tests

COURSE TEXTS

I know that books are expensive. You will be provided with notes and problem sets. However, it is always good to have a book to read to get a broader understanding and to get additional practice. Any introductory text on college algebra and calculus will do. Here are some books that you might find useful.

1. Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences by Haeussler, Paul and Wood.
2. Essential Mathematics for Economic Analysis by Sydaester and Hammond.