MAKERERE UNIVERSITY BUSINESS SCHOOL
FACULTY OF ECONOMICS, ENERGY, AND MANAGEMENT SCIENCE, DEPARTMENT OF ECONOMICS

SEMESTER I, ACADEMIC YEAR 2025/ 2026

Introduction to Mathematics for Economists
COURSE OUTLINE

Program:	Bachelor of Arts in Economics
Year of study:	I
Course Code:	ECB 1102
Contact hours per week:	Four (4)
Lecture days:	Mondays 1-3 PM; Fridays 3-5 PM
Lecture Room:	ECB 1102 - BLOCK 5 RM 1
Lecturers:	**1.** Dr. Miria Nakamya Tel. 0774 092 739; email: mnakamya@mubs.ac.ug 2. Ms. Adella G. Migisha Tel. 0787 371 916; email:buhandadella@gmail.com

Course description

This introductory course prepares first-year Bachelor of Arts in Economics students for core economics subjects by developing essential mathematical skills. It aims to build confidence, strengthen problem-solving abilities, and foster the capacity to think mathematically about real-life economic situations. While preparatory, learning is hands-on and progressive: students begin with familiar concepts and advance to more complex economic problems, using examples from Uganda and beyond. Key topics include algebra and basic calculus, taught through practical activities that link mathematics to economic applications. Through guided practice, group work, and real-world case studies, learners gain the skills to interpret data, model simple economic relationships, and confidently transition to more advanced economics courses.

Course Objectives

This course is intended to:

1. Expose students to basic algebra, including the rules of algebra, factoring, solving simple linear equations, and solving systems of linear equations using substitution and elimination methods.
2. Introduce a range of fundamental concepts in matrix algebra and provide an understanding of basic rules such as addition, subtraction, multiplication, scalar multiplication, and the application of the commutative, associative, and distributive laws.
3. Provide a foundation for applying matrix algebra to solve systems of equations and interpret the solutions in economic contexts.
4. Introduce the concepts of differentiation and integral calculus and demonstrate their application in analyzing economic problems.
5. Provide a foundation for solving basic optimization problems and illustrate their relevance in economics.

Learning Outcomes

By the end of this course, students should be able to:

1. Demonstrate knowledge of basic algebra, including rules of algebra, factoring, solving simple linear equations, and solving systems of linear equations using substitution and elimination methods.
2. Explain the basic concepts in matrix algebra and apply the rules for addition, subtraction, multiplication, scalar multiplication, and the associative, commutative, and distributive laws.
3. Define and compute the determinant and inverse of square matrices and use them to solve systems of equations based on simple economic models.
4. Distinguish between differentiation and integration and apply both techniques to solve economic problems.
5. Formulate and solve basic optimization problems, showing how these methods can be applied in economic decision-making.

Assessment

Students will sit for two independent coursework tests and one final examination. These assessments will contribute as follows:

- Coursework I: 15%
- Coursework II 15%
- Final Exam 70%

Topic series No.	Topic	Sub-Topics	Time allocated	Teaching Method	Reference Materials	Lecturer
1	Introduction and Revisiting the Real Number System	• Mathematics and Economics • Mathematical Models in Economics • Use of Mathematics in Economics • The real number system Sets of numbers: natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers • Properties of real numbers: commutative, associative, distributive laws • Absolute value and inequalities • Order of operations	1 week (4 hours)	• Interactive lectures • Q&A • Quizzes • Brain storming • Practical problem-solving exercises • Assignments • Group discussions • Consultations	**Main Texts** 1. Chiang, Alpha, C., & Kevin Wainwright (2005). *Fundamental Methods of Mathematical Economics* (4th ed.). Mc-Graw Hill-Irwin	**MN**

		(PEMDAS/BODMAS)				
2	Introduction to algebra	• Introduction to algebra and algebraic expressions. • rules of algebra and algebraic identities, • Review of Rules of Sums, Laws of Exponents, and Laws of Logarithms • Polynomials • Operations on polynomials - addition, substraction, multiplication, division • Factoring polynomials and other algrebraic expressions, • Solving individual and systems of equations • Relations and functions - Types of functions • Graphs of functions • Economic application	2 weeks (8 hours)	• Interactive lectures • Q&A • Quizzes • Brain storming • Practical problem-solving exercises • Assignments • Group discussions • Consultations	**Main Text** Edward,T. Dowling (2009*). Mathematical Methods for Business and Economics.* Schaum's Outline Series. **References** Lecturer's anecdotes	**MN**

2	Matrix algebra	• Definition of terms • Role of matrix algebra in economic analysis • Types of matrices • Sums, differences and products of matrices (rules) • Linear equations in matrix form • Matrix transposition • Determinants of matrices of order two • Matrix inversion • Simple rules for transforming matrix equations • Cramer's rule • Solution to a system of linear equations • Simple Economic application. Simple commodity model, National income determination, IS-LM analysis	2 weeks (8 hours)	• Interactive lectures • Q&A • Quizzes • Practical problem-solving exercises • Assignments • Group discussions • Consultations	**Main Texts** 1. Chiang, Alpha, C., & Kevin Wainwright (2005). *Fundamental Methods of Mathematical Economics* (4th ed.). Mc-Graw Hill-Irwin 2. Baldani, J., Bradfield, J., & Turner, R (2005). *Mathematical Economics* (2nd ed.), Thompson-South Western. **References** 1. Edward,T. Dowling (2009*). Mathematical Methods for Business and Economics.* Schaum's Outline Series. 2. Edward, T. Dowling (2011*). Introduction to Mathematics for Economists.* Schaum's outline series in Economics.	**MN**
*	CW Test One	CW test 1 will be Time Tabled by the AR's office and dated will be communicated.	I hour	Invigilated test	Tests venues, time and invigilators are indicated on CW Timetable	MN
3	Introduction to Differential Calculus	• Defining differentiation • The concept of a derivative • Rules rules of differentiation • Introductory economic application to: Marginal Utility (MU) Marginal Product (MP) Marginal Cost (MC) Marginal Revenue (MR) Economic application to a real-world problem	2 weeks (8 hours)	• Interactive lectures • Q&A • Quizzes • Assignments • Group discussions • Consultations	**Main Texts** Chiang, Alpha, C., & Kevin Wainwright (2005). *Fundamental Methods of Mathematical Economics* (4th ed.). Mc-Graw Hill-Irwin **References** 1. Edward,T. Dowling (2009*). Mathematical Methods for Business and Economics.* Schaum's Outline Series. 2. Edward, T. Dowling (2011*). Introduction to Mathematics for Economists.* Schaum's outline series in Economics.	**MN**

4	Introduction to Optimization	• Definition • Free vs constrained optimization • Maximization and Minimization problems • Optimization of single and multivariate functions • Some Economic application: Utility maximization, Profit maximization, cost minimization, output maximization etc • Economic application to real-world problem	3 weeks (12 hours)	• Interactive lectures • Q&A • Group Discussion • Revision questions • Practical problem-solving exercises • Assignments • Consultations	**Main Text** Chiang, Alpha, C., & Kevin Wainwright (2005). *Fundamental Methods of Mathematical Economics* (4th ed.). Mc-Graw Hill-Irwin **References** Edward,T. Dowling (2009*). Mathematical Methods for Business and Economics.* Schaum's Outline Series.	**AM**
*	CW Test Two	CW test II will be Time Tabled by the AR's office and dated will be communicated.	I hour	Invigilated test	Tests venues, time and invigilators are indicated on CW Timetable	AM
5	Optimization of functions using Linear Programming	• Definitions of concepts: - Objective function - Constraints - Restrictions, - Maximization and minimization problems - Slack variable - Surplus variable - Primal and Dual problems • Graphical solutions to linear programming • Advantages of the Dual in Linear programming • Economic application to real-world problem	2 weeks (8 hours)	• Interactive lectures • Q&A • Revision questions • Practical problem-solving exercises • Assignments • Group discussions • Consultations	**Main Text** Edward,T. Dowling (2009*). Mathematical Methods for Business and Economics.* Schaum's Outline Series **References** Chiang, Alpha, C., & Kevin Wainwright (2005). *Fundamental Methods of Mathematical Economics* (4th ed.). Mc-Graw Hill-Irwin	**AM**

6	Introduction to Integral Calculus	• Notation • Definite and indefinite integrals • Applications of integration to economic analysis: consumer and producer surplus • Economic application to real-world problem	1 week (4 hours)	• Interactive lectures • Q&A • Group discussions • Consultations	**Main Text** Edward, T. Dowling (2011). *Introduction to Mathematics for Economists.* Schaum's outline series in Economics. **References** Baldani, J., Bradfield, J., & Turner, R (2005). *Mathematical Economics* (2nd ed.), Thompson-South Western	**AM**

MN: Miria Nakamya
AM: Adella Migisha

Signature

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Team leader/Internal Examiner

Signature

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Head of Department