

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

SEMESTER I, ACADEMIC YEAR 2024/ 2025

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:	WTO
Lecturer:	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 course is intended to bring all BAE I students up to a minimum level of maths competency before exposure to core economics courses. The course introduces students to basic algebra and calculus, essential for economic analysis. The course lays a foundation for the acquisition and development of mathematical tools and skills that are often applied in many of the economics disciplines that the students study at later stages at the university. Students need to note that this is not a study of mathematics per se but an exposure to mathematical concepts and tools essential for economic analysis.

Learning objectives

This course is intended to:

- Expose students to basic algebra, such as rules of algebra, factoring, solving simple linear equations, and systems of linear equations using substitution and elimination methods
- Introduce students to a commendable number of basic concepts in matrix algebra and provide an understanding of the basic rules in matrix algebra, such as rules for adding, subtracting matrices, multiplying matrices, scalar multiplication to matrices, Commutative law, Associative law, and distributive law.
- Provide a foundation for the application of matrix algebra to systems of equations and how to obtain the solution.
- Introduce students to the concepts of differentiation and integral calculus and demonstrate how they are applied in economic analysis.
- Provide a foundation for optimization problems and how they can be applied in economics.

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Learning Outcomes

By the end of this course, students should:

- Be able to demonstrate knowledge of basic algebra such as rules of algebra, factoring, solving simple linear equations and systems of equations involving linear equations using substitution and elimination methods
- Understand the basic concepts in matrix algebra and demonstrate the basic rules in matrix algebra: the associative rule, commutative and distributive rules, matrix addition, subtraction, and scalar multiplication.
- Competently define and compute the determinant and inverse of square matrices.
- Be able to solve systems of equations using simple economic models.
- Appreciate the difference between differentiation and integration, as well as demonstrate their application to economic problems.
- Be able to solve basic optimization problems in economics.

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 to algebra	<ul style="list-style-type: none"> • Introduction to algebra and algebraic expressions. • rules of algebra and algebraic identities, • Rules of exponents • Polynomials • Operations on polynomials <ul style="list-style-type: none"> - addition, subtraction, multiplication, division • Factoring polynomials and other algebraic expressions, • Solving individual and systems of equations • Relations and functions <ul style="list-style-type: none"> - Types of functions 	2 weeks (6 hours)	<ul style="list-style-type: none"> • Q&A • Brain storming • Stories 	<p>Main Text Edward,T. Dowling (2009). <i>Mathematical Methods for Business and Economics</i>. Schaum's Outline Series.</p> <p>References Lecturer's anecdotes</p>	MN

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		<ul style="list-style-type: none"> • Graphs of functions • Economic application 				
2	Matrix algebra	<ul style="list-style-type: none"> • Definition • Some terms • Role of matrix algebra in economic analysis • Types of matrices • Sums, differences and products of matrices (rules) • Linear equations in matrix form • Determinants of matrices of order two • Matrix transposition • Matrix inversion • Simple rules for transforming matrix equations • Cramer's rule • Economic application. Simple commodity model, National income determination, IS-LM analysis 	3weeks (9 hours)	<ul style="list-style-type: none"> • Straight lectures • Q&A • Quizzes • Assignments • Group discussions • Consultations 	<p>Main Texts</p> <p>1. Chiang, Alpha, C., & Kevin Wainwright (2005). <i>Fundamental Methods of Mathematical Economics</i> (4th ed.). Mc-Graw Hill-Irwin</p> <p>2. Baldani, J., Bradfield, J., & Turner, R (2005). <i>Mathematical Economics</i> (2nd ed.), Thompson-South Western.</p> <p>References</p> <p>1. Edward,T. Dowling (2009). <i>Mathematical Methods for Business and Economics</i>. Schaum's Outline Series.</p> <p>2. Edward, T. Dowling (2011). <i>Introduction to Mathematics for Economists</i>. Schaum's outline series in Economics.</p>	MN
*	CW Test One	CW test 1 will be Time Tabled by the AR's office and dated will be communicated.	1 hour	Invigilated test	Tests venues, time and invigilators are indicated on CW Timetable	Dickson to be in-Charge
3	Introduction to Differential Calculus	<ul style="list-style-type: none"> • Defining differentiation • The concept of a derivative • Rules rules of differentiation • Some economic application -Finding MU -Finding MP -Finding MC -Finding MR -Finding elasticity • Economic application to real- world problem 	2weeks (6 hours)	<ul style="list-style-type: none"> • Straight lectures • Q&A • Quizzes • Assignments • Group discussions • Consultations 	<p>Main Texts</p> <p>Chiang, Alpha, C., & Kevin Wainwright (2005). <i>Fundamental Methods of Mathematical Economics</i> (4th ed.). Mc-Graw Hill-Irwin</p> <p>References</p> <p>1. Edward,T. Dowling (2009). <i>Mathematical Methods for Business and Economics</i>. Schaum's Outline Series.</p>	MN

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					2. Edward, T. Dowling (2011). <i>Introduction to Mathematics for Economists</i> . Schaum's outline series in Economics.	
4	Introduction to Optimization	<ul style="list-style-type: none"> • 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 (9 hours)	<ul style="list-style-type: none"> • Straight lectures • Q&A • Group Discussion • Revision questions 	<p>Main Text Chiang, Alpha, C., & Kevin Wainwright (2005). <i>Fundamental Methods of Mathematical Economics</i> (4th ed.). Mc-Graw Hill-Irwin</p> <p>References Edward,T. Dowling (2009). <i>Mathematical Methods for Business and Economics</i>. Schaum's Outline Series.</p>	AM
*	CW Test Two	CW test II will be Time Tabled by the AR's office and dated will be communicated.	1 hour	Invigilated test	Tests venues, time and invigilators are indicated on CW Timetable	Dickson
5	Optimization of functions using Linear Programming	<ul style="list-style-type: none"> • Definitions of concepts: <ul style="list-style-type: none"> - 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 	2 weeks (6 hours)	<ul style="list-style-type: none"> • Straight lectures • Q&A • Revision questions 	<p>Main Text Edward,T. Dowling (2009). <i>Mathematical Methods for Business and Economics</i>. Schaum's Outline Series</p> <p>References Chiang, Alpha, C., & Kevin Wainwright (2005). <i>Fundamental Methods of Mathematical Economics</i> (4th ed.). Mc-Graw Hill-Irwin</p>	AM

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		problem				
6	Introduction to Integral Calculus	<ul style="list-style-type: none"> • Notation • Definite and indefinite integrals • Applications of integration to economic analysis: consumer and producer surplus • Economic application to real- world problem 	1 week (3 hours)	<ul style="list-style-type: none"> • Straight lectures • Q&A • Group discussions • Consultations 	<p><u>Main Text</u> Edward, T. Dowling (2011). <i>Introduction to Mathematics for Economists</i>. Schaum’s outline series in Economics.</p> <p><u>References</u> Baldani, J., Bradfield, J., & Turner, R (2005). <i>Mathematical Economics</i> (2nd ed.), Thompson-South Western</p>	AM

MN: Miria Nakamya

AM: Adella Migisha

Signature

Signature

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Team leader/Internal Examiner

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Head of Department

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