

**Faculty of Economics & Political Science**

**Mathematical Economics**

**Information :**

**Course Code :** MTH 210      **Level :** Undergraduate      **Course Hours :** 3.00- Hours

**Department :** Department of Economics

**Instructor Information :**

Title	Name	Office hours
Lecturer	Fawzia Ahmed Abdelhamid Ibrahim	
Teaching Assistant	AMR MOSTAFA MAHMOUD MOSTAFA	

**Area Of Study :**

This course presents different types of equations with their graphical representations; it proceeds to the rules of differentiation, (partial differentiation- marginal analysis- different types of optimization, linear and non-linear first and second order differentiation). Then it continues with the rules of integration, (indefinite and definite integration). The course also introduces matrices (definition- operations on matrices and determinants, inverse of a matrix, Jacobian Matrix, Hessian Matrix). It also identifies the Linear- Equation System and Cramer's Rule; homogeneous and homothetic functions, as well as explaining concavity and convexity; quasi- concavity and quasi-convexity.

**Course Goals:**

- Acquaint students with graphing different types of equations and analyze them.
- Teach students the calculation of derivatives, partial derivatives and solving optimization problems.
- Calculate different comparative static problems to find maximum and/or minimum of functions of single or several variables.
- Familiarize students with the rules of Integration.

**Description :**

This course presents different types of equations with their graphical representations; it proceeds to the rules of Differentiation, (partial differentiation- marginal analysis- different types of optimization, Linear and Non- Linear first and second order differentiation). Then it continues with the rules of Integration, (Indefinite and definite integration). The course also introduces Matrices (definition- operations on matrices and determinants, inverse of a matrix, Jacobian Matrix, Hessian Matrix). It also identifies the Linear- Equation System and Cramer's Rule; Homogeneous and Homothetic Functions, as well as explaining Concavity and Convexity; Quasi- concavity and quasi-convexity.

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	Recognize how to graph different types of equations and analyze them.
2 -	Define concepts of differentiation and Integration and their applications in economy.
3 -	Express definition, operations and determinants of matrices
4 -	Distinguish between different types of functions.
5 -	Identify Homogeneous and Homothetic Functions, as well as explaining Concavity and Convexity.

**b. Intellectual Skills: :**

1 -	Analyze markets real case studies using optimization of economic functions.
2 -	Relate the mathematical rules of differentiation, integration and matrices to real situations.

**c. Professional and Practical Skills: :**

1 -	Apply the Integration and derivatives rules to analyze economic problems and functions such as: profit, cost and revenue functions.
2 -	Employ mathematical equations to solve several economic problems.

**d. General and Transferable Skills: :**

1 -	Justify economic real situations with critical thinking.
2 -	Inspire Innovation and knowing how to work towards the results.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introductory lecture and course outline - Revision of functions	5	1	1
Linear Equations (Graphs, Algebraic solution, supply and demand analysis, National Income determination)	10	2	2
Non Linear Equations(Quadratic functions, Revenue, cost and profit)	10	2	2
Basic concepts of Differentiation : Economic Applications	5	1	1
Midterm Exam		1	
Partial differentiation: basic concepts, rules and Economic Applications	5	1	1
Optimization of economic functions: Economic Applications applying the Lagrange multipliers approach to constrained optimization problems.	5	1	1
Integration (Definite and indefinite)	5	1	1
Matrices (definition- operations on matrices and determinants, inverse of a matrix, Jacobian Matrix, Hessian Matrix)	10	2	2
Homogeneous and Homothetic Functions Concavity and Convexity; Quasi- concavity and quasi-convexity	10	2	2
Final Exam		1	

**Teaching And Learning Methodologies :**

Data show and computer in lectures.
Case studies Applications.
Group discussion and presentations.

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Course Work (Attendance, Participation, Assignments, Quizzes, Research Paper...)	20.00		To assess understanding and to assess theoretical background of the intellectual and practical skills.

Final Exam	40.00	15	To assess knowledge and intellectual skills.
Midterm Exam	30.00	7	To assess professional skills.
Tutorial	10.00		

**Books :**

Book	Author	Publisher
No Book	no	no