

**Faculty of Economics and 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	Rania Ramadan Moawad Mohamed	3
Teaching Assistant	Mennatallah Mohamed Hassan Mahmoud Mohamed Elgamal	

**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) D	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		