Kuwait University
College of Busines Administration
Department of Economics

Mathematics for Economists (ECON 205/ ECON 230)

Spring 2021/2022

Instructor:	Ebrahim Alebrahim	**Time:**	11:00-11:50AM
Email:	ebrahim.alebrahim@ku.edu.kw	**Place:**	D3 1005
Website:	www.ealebrahim.com		
Office Hours:	10:00-10:45 or by appointment	**Office No.:**	1074

Course Pages:

https://moodle.ku.edu.kw, and MS Teams.

Office Hours: 10:00-10:45

References:

The primary textbook for the course is

- Vassilis C. Mavron, and Timothy N Philips, Elements of Mathematics for Economics and Finance, Springer, 2000. Accessible as an electronic book from the university library website: http://kuniv.vdiscovery.org/ (login with your ID then click on the ebook link) (Will be referenced as EM in the syllabus)

Additional recommended references:

- Mik Wisniewski, Mathematics for Economics an Integrated Approach, Palgrave Macmillan, Third Edition, 2013 (Will be referenced as MIK in the syllabus)

Course description:

This course covers the basic mathematical tools required for the study of economic intermediate theory courses, econometric and upper-division electives in economics. Topics include economic applications of functions, derivatives and integrals, optimization with two or more independent variables, constrained optimization, matrix algebra, and difference and differential equations.

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Course learning outcomes:

- CLO 1. Model economic questions as mathematical problems.
- CLO 2. Apply their prior knowledge of calculus and matrix algebra to economic applications.
- CLO 3. Mathematically express economic concepts and successfully interpret relevant variables and parameters in economic models.
- CLO 4. Acquire foundations of major techniques used to solve constrained optimization problems in economics.
- CLO 5. Acquire foundations of major difference and differential equations techniques used in economic theory.

CLO	Competency*			
	Analytical	Communication	Information Technology	Business Ethics
1	I			
2	A			
3	R			
4	I			
5	I			

Types of Emphasis:

- **(I)ntroduce:** Students will be introduced to the skill and their grasp of it assessed in the course.
- **(A)pply:** The course will not cover the skill. Students should have a high-level grasp of the skill and are required to apply it in the course.
- **(R)einforce:** Students should have an introductory-level grasp of the skill and the course will improve their mastery to a higher level.

Prerequisites:

- For students admitted prior to 2021/2022: ECON 111, and taking ISOM 110 is highly recommended.
- For students admitted from 2021/2022 onward: ECON 140, and ISOM 110.

Grading Policy:

- Assignments ..... (5%)
- Quizzes ..... (35%)
- Midterm ..... (20%)
- Final ..... (40%)

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Important Dates:

- Midterm ..... 12/05/2022 11:00-11:50AM Location: D3 1005
- Final Exam ..... Check the portal.

Course Policies:

- **Attendance and Participation:** Every student in this course must abide by the Kuwait University Policy on Attendance (published in the Student Guide, Chapter 3, Section 13). A copy of the student guide can be accessed online on: http://www.ku.edu.kw/cs/groups/ku/documents/ku_content/kuw055940.pdf
- **Cheating and Plagiarism:** Every student in this course must abide by the Kuwait University Policy on Cheating and Plagiarism (published in the Student Guide, Chapter 3, Section 2).

Academic Honesty:

Fairness, trust, and honesty should be the basis between each student and their colleagues as well as the instructor. Plagiarism and cheating are strictly prohibited.

University rules:

Students are required to read and be aware of the university rules as stated in:
http://www.ku.edu.kw/cs/groups/ku/documents/ku_content/kuw055940.pdf

Grade Distribution:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
95-100	90-94	87-89	84-86	80-83	77-79	73-76	70-72	65-69	60-64	Below 60

Tentative Course Outline:

Week	Module	Topics
1	**Introduction and Motivation**	• Why mathematics is important • What are models • Types of Models • Examples
1 & 2	**Economic relationships**	• Review of linear and non-linear equations(EM2.2,2.4), solutions of quadratic equations(EM3.3) , simultaneous equations (EM2.3), and functions (EM4.1) • Applications to budget line (EM2.5) and to demand and supply models (EM2.6) • break-even profit (EM3.4) • quadratic demand and supply models (EM3.4), and cost function (EM4.4) • Review of exponential and logarithmic functions (EM5.1-5.3) • Applications: return to scale and linearization of production function (EM5.4)
3 & 4	**Matrix Algebra**	• Fundamentals (EM10.1) • Matrix operations (EM10.2) • Systems of equations (EM10.3) • Determinants and the adjoint Method (EM10.5) • Appliaction to market equilibrium (MIK B6.1) • Application to national income model (MIK B6.3)
5 & 6	**Differentiation**	• Basics of limits (EM4.2)• Review of differentiation and differentiation rules (EM6.1-6.3) •Applications: concept of marginals, marginal revenue , marginal cost, marginal propensities (EM6.4), and marginal products (EM6.7)
7	**Single variable optimization**	• Review of local and global extremum, functions concavity, and second order derivative tests ((EM7.1-7.5) • Application to perfect competition and monopoly (EM7.7) • Application to production function (EM7.6)• Application to government taxes (EM7.8)
8	**Partial differentiation**	• Review of partial differentiation, differentials, and total derivatives, and chain rules (EM8.1-8.6) • Applications to Economics(EM8.7): Elasticity and cross-elasticises, arc and point elasticity, marginal rate of substitution, marginal products.
9	**Unconstrained optimization**	• Review of multivariate optimization (EM9.1-9.2) •Application to cost minimization (EM9.2)
10	**Constrained optimization**	• Review of the Lagrange multiplier and its interpretation (EM9.3). • Graphical representation of constrained problems: Iso-curves (EM9.4) • Applications to utility maximization, production, and cost minimization (EM9.3) • Envelope theorem*
11	**Integration**	• Review of definite and indefinite integrals and integration rules (EM11.1-11.4) •Applications to consumer's surplus(EM11.6), and producer's surplus (EM11.5) for linear and non-linear demand and supply functions.
12	**Difference equations**	• Introduction to difference equations (EM12.1-12.2) • Solution and stability of first order linear difference equations (EM12.3-12.4) • Harrod-Domar growth model (MIK E4.6)
13	**Differential equations**	• Introduction to differential equations (EM13.1) • Solution and stability of first order differential equations (EM13.2-13.3)

CBA Competency Goals

1. **Analytical Competency**: A CBA graduate will be able to use analytical skills to solve business problems and make a well-supported business decision.

   Student Learning Objectives:

   1.1 Use appropriate analytical techniques to solve a given business problem.

   1.2 Critically evaluate multiple solutions to a business problem.

   1.3 Make well-supported business decisions.

2. **Communication Competency**: A CBA graduate will be able to communicate effectively in a wide variety of business settings.

   Student Learning Objectives:

   2.1 Deliver clear, concise, and audience-centered presentations.

   2.2 Write clear, concise, and audience-centered business documents.

3. **Information Technology Competency**: A CBA graduate will be able to utilize Information Technology for the completion of business tasks.

   Student Learning Objectives:

   3.1 Use data-processing tools to analyze or solve business problems.

4. **Ethical Competency**: A CBA graduate will be able to recognize ethical issues present in business environment, analyze the tradeoffs between different ethical perspectives, and make a well-supported ethical decision.

   Student Learning Objectives:

   4.1 Identify the ethical dimensions of a business decision.

   4.2 Recognize and analyze the tradeoffs created by application of competing ethical perspectives.

   4.3 Formulate and defend a well-supported recommendation for the resolution of an ethical issue.

5. **General Business Knowledge**: A CBA graduate will be able to demonstrate a basic understanding of the main business disciplines' concepts and theories.

   Student Learning Objectives:

   5.1 Acquire a fundamental understanding of knowledge from the main business disciplines (e.g. finance, accounting, marketing, and management information systems, among others).