

Syrian Arab Republic	 SVU <small>الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY</small>	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

## Course Description: Mathematics for Economic and Business

### 1- Basic Information:

Course Name	Mathematics for Economic and Business
Course ID	GMA403
Contact Hours (Registered Sessions)	24 Hours
Contact Hours (Synchronized Sessions)	24 Hours
Mid Term Exam	-
Exam	75 min
Registered Sessions Work Load	36 Work Load Hours
Synchronized Session Work Load	24 Work Load Hours
Credit Hours	5 Credit Hours
Course Level	4

### 2- Pre-Requisites:

Course	ID
Mathematics	GMA401
Probability &Statistics	GMA402

### 3- Course General Objectives:

The objective of this course is to empower students of effective application of the mathematical tools, to understand, analyze, and explain economic phenomena. That imply to achieve the following objectives:

- A) Student will acquire reasonable methodology and its mathematical tools to treat with economic phenomena.
- B) Student will acquire skills to identify economic problem, and determine its variables, and formulate mathematical formula between these variables.
- C) Student will be able to explore solutions for the economic problem, by applying learned tools or, finding further tools or, working with team's members.
- D) Student will acquire communication skills to explain and ... the economic problem after mathematical treating.
- E) Student will be oriented to use software applications to build and solve the problem, like MS Excel, or Mat Lab.

Syrian Arab Republic	 SVU <small>الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY</small>	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

#### 4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Acquire large understanding of principles and basics to apply effectively mathematical tools in economics sciences, and perceive how to enlarge his knowledge base as necessary.
ILO2	Apply numeric functions to express relations between variables of the economic problem, and applying functions of Costs, Revenues, Profits, and analyses demand and supply problem.
ILO3	Empower student to use inequalities to express constraints on economic resources, and to explore feasible or optimal solutions in some cases.
ILO4	Identify and understand the temporal or functional sequences of numeric values of economic variables, and apply numerical series to express and treat this problem.
ILO5	Identify and Understand some non-linear economic phenomena, and express it in exponential or logarithmic functions, and explore solutions or explain these phenomena.
ILO6	Understand differentiation Basics and rules, and applying it on the marginal and elasticity problems, as well as in the case of univariate functions like marginal revenue or marginal profit or marginal cost, or in the case of multi-variate functions like production or partial elasticity of demand and supply.
ILO7	Understand mathematical Integration Basics and rules, and applying it on the economic problems, like consumer's surplus or producer's surplus, or to find long-term production function or Cobb-Douglas functions.
ILO8	Understand matrices basics, and applying it in specific cases like input-output tables or Leontief tables.

#### 5- Course Syllabus (24 hours of total Recorded Sessions, 24 hours of total synchronized sessions)

- RS: Recorded Sessions; SS: Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	<b>Basics Review:</b> <ul style="list-style-type: none"> <li>a) Number fields.</li> <li>b) Mathematical expression.</li> <li>c) Graph plotting.</li> <li>d) Percentages use.</li> <li>e) Basic rules of calculus.</li> </ul>	2	2	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Training exercises and assignments, should be distributed by teacher, and discuss solutions in next session.
ILO2	<b>Numerical Functions of first and second orders:</b> <ul style="list-style-type: none"> <li>a) Linear Functions.</li> <li>b) Solution of simultaneous linear equations.</li> <li>c) Quadratic functions.</li> </ul>	4	2	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	<b>Assignment (1):</b> Analysis of case about demand and supply functions, or about Profit function.

Syrian Arab Republic	 SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		جامعة الافتراضية السورية

	d) Functions of: Revenues, Cost, and Profit. e) Demand and supply analysis.				
ILO3	<b>Inequalities and its applications:</b> a) Inequalities Rules. b) Solve an inequality. c) Solution of simultaneous linear inequalities. d) Formulate economic constraints using inequalities.	2	2	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Training exercises and assignments, should be distributed by teacher, and discuss solutions in next session.
ILO4	<b>Numeric Series and its applications:</b> a) Mathematical Sequence Basics. b) Arithmetic Series. c) Geometric Series. d) Series' Limit. e) Applications: NPV and FV of an investment flow.	4	2	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	<b>Assignment (2):</b> Analysis of case about investment project, calculate Net Present Value and Future Value of a financial flow.
ILO5	<b>Exponential and Logarithmic functions and its applications:</b> a) Basic Concepts. b) Analysis of the Logarithmic function. c) Using Logarithmic functions to solve complex equations. d) Analysis of Growth and Recession Functions.	2	4	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Training exercises and assignments, should be distributed by teacher, and discuss solutions in next session.
ILO6	<b>Differentiation and Marginal Phenomena:</b> a) Basic Rules of Derivatives. b) Marginal functions of some economic functions: Marginal revenue, marginal cost, marginal profit. c) Optimization of specific economic function. d) Partial differentiation of multi-variate functions. e) Analysis of the marginal elasticity of demand and production functions.	4	6	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Training exercises and assignments, should be distributed by teacher, and discuss solutions in next session.
ILO7	<b>Integration and its Applications:</b> a) Indefinite integration. b) Definite integration.	4	4	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars	<b>Project (1):</b> How to find integral function of some

Syrian Arab Republic	 SVU <small>الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY</small>	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

	c) Integral functions for some marginal functions: total cost, total revenue. d) Analysis of Consumer's surplus, and producer's surplus. e) Analysis of investment flow. f) Long-term Production and Cobb-Douglas functions.			<input checked="" type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	economic function like production function. (Not more than 5 pages)
ILO8	<b>Matrices and Economic Tables;</b> a) Basic concepts and operations. b) Matrix inversion. c) Using matrices to solve simultaneous linear equalities d) Applications: Input, output, and Leontief tables.	2	4	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	Training exercises and assignments, should be distributed by teacher, and discuss solutions in next session.

## 6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams	Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Work		

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Acquire large understanding of principles and basics to apply effectively mathematical tools in economics sciences, and perceive how to enlarge his knowledge base as necessary.	a) Identify number groups, specifically real numbers. b) Express economic variables and functions in mathematical form. c) Plot the graph of a uni-variate function. d) Use percentages and explain it. e) Use basic operations (sum, multiplication, power, brackets, ...).	✓	✓	✓		
ILO2	Apply numeric functions to express relations between variables of the economic problem, and applying functions of Costs, Revenues, Profits, and analyses demand and supply	a) Solve linear equations, plot graph, sign, ... b) Solve simultaneous linear equations. c) Solve quadratic equation using Delta, and study its sign. d) Formulate and plot graph of economic functions: Revenue, Cost, profit. Find optimal values.	✓	✓	✓		✓

Syrian Arab Republic	 SVU <small>الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY</small>	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

	problem.	e) Analyze supply and demand functions, and find the equilibrium point.					
ILO3	Empower student to use inequalities to express constraints on economic resources, and to explore feasible or optimal solutions in some cases.	a) Formulate resources constraints as linear and quadratic inequalities. b) Solve inequalities system via signs. c) Solve algebraically and graphically inequalities system.	✓	✓	✓		
ILO4	Identify and understand the temporal or functional sequences of numeric values of economic variables, and apply numerical series to express and treat this problem.	a) Identify time or logical series. b) Find general form of arithmetic series. c) Find general form of geometric series. d) Sum arithmetic, or geometric series. e) Find limits of series, and remember famous limits and operations.	✓	✓	✓		
ILO5	Understand some non-linear economic phenomena, and express it in exponential or logarithmic functions, and explore solutions or explain these phenomena.	a) Remember basic concepts of exponential and logarithmic functions. b) Remember natural and n_base logarithm. Use of e number. c) Analyze of logarithmic functions in specific cases. d) Use logarithmic functions to solve complex equations.	✓	✓	✓		
ILO6	Understand differentiation Basics and rules, and applying it on the marginal and elasticity problems, as well as in the case of univariate functions like marginal revenue or marginal profit or marginal cost, or in the case of multi-variate functions like production or partial elasticity of demand and supply.	a) Remember derivative and marginal concepts. b) Remember basic rules of differentiation. c) Find marginal functions: marginal cost, marginal revenue, and marginal profit. d) Plot graph and find optimal value. e) Remember partial derivative in case of multi-variate function. f) Find marginal elasticity of demand or production functions.	✓	✓	✓		
ILO7	Understand mathematical Integration Basics and	a) Remember relation between integral and derivative. b) Identify definite and indefinite	✓	✓	✓		✓

Syrian Arab Republic	 SVU <small>الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY</small>	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

	<p>rules, and applying it on the economic problems, like consumer's surplus or producer's surplus, or to find long-term production function or Cobb-Douglas functions.</p>	<p>integration.</p> <ul style="list-style-type: none"> <li>c) Remember basic rules of integration.</li> <li>d) Find integral cost and revenue functions.</li> <li>e) Apply integration to analyze consumer's surplus, and producer's surplus.</li> <li>f) Apply integration to find the sum of investment flow.</li> <li>g) Identify long-term production and Cobb-Douglas functions.</li> </ul>				
ILO8	<p>Understand matrices basics, and applying it in specific cases like input-output tables or Leontief tables.</p>	<ul style="list-style-type: none"> <li>a) Remember Basic concepts of matrices.</li> <li>b) Find matrix transpose, addition. Multiply 2 matrices.</li> <li>c) Find determinant, and inverse matrix.</li> <li>d) Use Matrices to solve linear equations.</li> <li>e) Use Crammer's rule.</li> <li>f) Apply matrices on input-output and Leontief tables</li> </ul>	✓	✓	✓	

## 7- Practice Tools:

Tool Name	Description
MS Excel software	Electronic tables very useful to build and solve economic problems.
Mat Lab software	Software oriented mathematical applications.  (These tools are just helping tools and, they are not essential to understand the course subjects).

## 8- Main References

- 1- Ian JACQUES (2018). **Mathematics for Economics and Business**. PEARSON Education Limited, United Kingdom. 9<sup>th</sup> Edition (2018). ISBN: 978-292-19166-9.
- 2-

Syrian Arab Republic	 الجامعية الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

## 9- Additional References

- 1- ROSSER, Mike. & LIS, Piotr. (2016). **Basic Mathematics for Economists**. Third Edition, Routledge Taylor & Francis Group, London, U.K. ISBN: 9780415485920.
- 2- Alex, SVIRIN (2004). **1300 Math Formulas**. <http://fribok.blogspot.com>. ISBN: 9949107741
- أبو صبحا، سليمان (2014). **الرياضيات للعلوم الاقتصادية والإدارية**. دار الأكاديميون للنشر والتوزيع. عمان، الأردن. 3 .ISBN: 9957449079, 9789957449070
- البياتي، محمود مهدي & القاضي، دلال. (2015). **الرياضيات وتطبيقاتها في العلوم الإدارية والاقتصادية**. دار الحامد للنشر والتوزيع. عمان، الأردن. 4 ISBN: 5095329957