

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

Course Definition: *Linear Algebra*

1- Basic Information:

Course Name	Linear Algebra
Course ID	LA
Contact Hours (Registered Sessions)	15
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	-
Exam	75 min
Registered Sessions Work Load	30
Synchronized Session Work Load	36
Credit Hours	3

2- Pre-Requisites:

Course	ID
Abstract Algebra	AS

3- Course General Objectives:

The course aims at presenting basic concepts, the computational techniques and tools of linear algebra in applications, related to computer science. It needs the concept of vector space to study the structure of a group for relationships and processes that are defined on the elements of this group, and to see the organizational structure of this group according to the links between its elements. Then we study linear transformations as the relationships between vector spaces expressed by. Then we study matrices and their relationship to linear transformations, and then determinants and solving systems of linear equations. Then we study vector spaces with a dot product. Finally, we study the eigenvalues and eigenvectors, similarity and diagonalization and some useful geometrical applications, especially in image processing (in computer science) and in studying the basic properties of the curves and surfaces of second degree.

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Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Learning Vector Spaces and its applications.
ILO2	Learning matrices as a mathematical concept and a basic mathematical tool to simplify most of the concepts of linear algebra.
ILO3	Learning determinants and its applications for solving systems of linear equations and some geometrical concepts.
ILO4	Learning linear transformations and some useful geometrical applications in the field of computer science.
ILO5	Learning orthogonally and orthogonal matrices, QR-factorization.
ILO6	Learning Eigenvalues and Eigenvectors, Similarity and Diagonalization and some useful geometrical applications in the field of computer science.

4- Course Syllabus (18 hours of total synchronized sessions)

- **RS:** Recorded Sessions; **SS:** Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	<ul style="list-style-type: none"> • Vector Spaces and its applications 	3	4.5	assignments	Exercises
ILO2	<ul style="list-style-type: none"> • Matrices and its applications. 	1.5	3	assignments	Exercises
ILO3	<ul style="list-style-type: none"> • Determinants and its applications for solving systems of linear equations and some geometrical concepts. 	3	3	assignments	Exercises
ILO4	<ul style="list-style-type: none"> • Linear transformations and some useful geometrical applications in the field of computer science. 	1.5	1.5	assignments	Exercises
ILO5	<ul style="list-style-type: none"> • Orthogonally and orthogonal matrices, QR-factorization. 	3	3	assignments	Exercises
ILO6	<ul style="list-style-type: none"> • Eigenvalues and Eigenvectors, Similarity and Diagonalization and some useful geometrical applications. 	3	3	assignments	Exercises

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5- 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	Vector Spaces and its applications		✓		✓		✓
ILO2	Matrices and its applications.		✓		✓		✓
ILO3	Determinants and its applications for solving systems of linear equations and some geometrical concepts.		✓		✓		✓
ILO4	Linear transformations and some useful geometrical applications in the field of computer science.		✓		✓		✓
ILO5	Orthogonally and orthogonal matrices, QR-factorization.		✓		✓		✓
ILO6	Eigenvalues and Eigenvectors, Similarity and Diagonalization and some useful geometrical applications.		✓		✓		✓

6- Practice Tools:

Tool Name	Description
Non	

7- Main References

- 1- Linear Algebra, A Modern Introduction, **David Poole**, 2011, International Student Edition.
- 2- Linear Algebra And Its Applications, **David C Lay**, 2012,4-th Edition, PEARSON.
- 3- Linear Algebra with Applications, **Otto Bretscher**, 1999,4-th Edition, **Oxford University Press**.

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8- Additional References

- 1- Elementary Linear Algebra - **K. R. Matthews**, Department of mathematics university of Queensland, Second Online Version, December 1998.
- 2- Introduction to matrix Algebra - University of South Florida - Copyrighted to Autar K. Kaw – 2002.