



مركز الاعتماد  
وإضمان الجودة  
ACCREDITATION & QUALITY ASSURANCE CENTER



**The University of Jordan**

**Accreditation & Quality Assurance Center**

## **Course Syllabus**

**Course Name: Linear Algebra I**

## Course Syllabus

1	Course title	Linear Algebra I
2	Course number	0301241
3	Credit hours	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	0301102
5	Program title	B.Sc. Mathematics
6	Program code	
7	Awarding institution	The University of Jordan
8	School	Science
9	Department	Mathematics
10	Course level	College requirement
11	Year of study and semester (s)	All semesters
12	Other department (s) involved in teaching the course	None
13	Main teaching language	English
14	Delivery method	Face to face learning
15	Online platforms(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom <input type="checkbox"/> Others.....
16	Issuing/Revision Date	4 <sup>th</sup> Nov , 2022

### 17 Course Coordinator:

Name: Prof. Hasan Alnajjar	Contact hours: 12:30 – 1:30 (Su, Tue, Thu)
Office number: 311	Phone number: 22081
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## 18 Other instructors:

**Name:** Prof. Fuad Kittaneh

Office number: 210

Phone number: 22063

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Contact hours: 1:30 – 2:30 (Su, Tue, Thu)

**Name:** Prof. Emad Abuosba

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## 19 Course Description:

As stated in the approved study plan.

Systems of linear equations; matrices and matrix operations; homogeneous and nonhomogeneous systems; Gaussian elimination; elementary matrices and a method for finding  $A^{-1}$ ; determinants; Euclidean vector spaces; linear transformations from  $R^n$  to  $R^m$  and their properties; general vector spaces; subspaces; basis; dimension; row space; column space; null space of a matrix; rank and nullity; inner product spaces; eigenvalues and diagonalization; linear transformations.

## 20 Course aims and outcomes:

### A- Aims:

1. Master basic concepts and techniques of linear algebra.
2. Use these concepts and techniques in applications and mathematical modeling.
3. Perform computations involving linear systems, matrices, vector spaces, and linear transformations.
4. Acquire skills to write clear and complete solutions to linear algebra problems.
5. Develop the ability to prove basic linear algebra results

### B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)
SLOs of the course								
1-Solve systems of linear equations using the Gauss-Jordan elimination method	●							
2- Compute determinants, and prove the basic theorems about determinants and their properties					●			
3-Employ matrices to solve systems of linear equations	●							
4- Prove the basic theorems about systems of linear equations and matrices					●			
5- Define the concepts of vector spaces, subspaces, linear combinations, and determine spanning sets, linear independence, bases, dimension	●							
6-Define the concepts of inner product spaces, and determine norms, angles between vectors, orthogonality, and orthonormal bases	●							
7- Compute the eigenvalues and eigenvectors of matrices, and prove the basic theorems about these concepts.					●			
8- Use linear algebra concepts to solve real life applications							●	

## 21. Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Introduction to Systems of Linear Equations	1	Face to Face	Moodle		Exam	ExamText Book
	1.2	Gaussian Elimination	1	Face to Face	Moodle		Exam	Text Book
	1.3	Gaussian Elimination	1	Face to Face	Moodle		Exam	Text Book
2	2.1	Matrices and Matrix Operations	5	Face to Face	Moodle		Exam	Text Book
	2.2	Matrices and Matrix Operations	5	Face to Face	Moodle		Exam	Text Book
	2.3	Inverses; Rules of Matrix Arithmetic	1	Face to Face	Moodle		Exam	Text Book
3	3.1	Inverses; Rules of Matrix Arithmetic	5	Face to Face	Moodle		Exam	Text Book
	3.2	Elementary Matrices and a Method for Finding $A^{-1}$	1	Face to Face	Moodle		Exam	Text Book
	3.3	Elementary Matrices and a Method for Finding $A^{-1}$	1	Face to Face	Moodle		Exam	Text Book
4	4.1	Further Results on Systems of Equations and Invertibility	7	Face to Face	Moodle		Exam	
	4.2	Diagonal, Triangular, and Symmetric Matrices	1	Face to Face	Moodle		Exam	Text Book
	4.3	Diagonal, Triangular, and Symmetric Matrices.	5	Face to Face	Moodle		Exam	Text Book
5	5.1	Determinants by Cofactor Expansion	1	Face to Face	Moodle		Exam	Text Book
	5.2	Evaluating Determinants by Row Reduction	5	Face to Face	Moodle		Exam	Text Book
	5.3	Properties of the	5	Face to Face	Moodle		Exam	Text Book

		Determinant Function						
6	6.1	Properties of the Determinant Function	5	Face to Face	Moodle		Exam	Text Book
	6.2	Finding inverse using determinants	1	Face to Face	Moodle		Exam	Text Book
	6.3	Cramer's rule	7	Face to Face	Moodle		Exam	Text Book
7	7.1	Real Vector Spaces	1	Face to Face	Moodle		Exam	Text Book
	7.2	Subspaces	5	Face to Face	Moodle		Exam	Text Book
	7.3	Subspaces,	5	Face to Face	Moodle		Exam	Text Book
8	8.1	Linear combination and span	5	Face to Face	Moodle		Exam	
	8.2	Linear Independence	5	Face to Face	Moodle		Exam	Text Book
	8.3	Basis and Dimension	5	Face to Face	Moodle		Exam	Text Book
9	9.1	Row Space, Column Space	1	Face to Face	Moodle		Exam	Text Book
	9.2	Nullspace	1	Face to Face	Moodle		Exam	Text Book
	9.3	Rank and Nullity	1	Face to Face	Moodle		Exam	Text Book
10	10.1	Inner Products	1	Face to Face	Moodle		Exam	Text Book
	10.2	Angle and Orthogonality in Inner Product Spaces .	5	Face to Face	Moodle		Exam	Text Book
	10.3	Orthonormal Bases; Gram-Schmidt Process	5	Face to Face	Moodle		Exam	Text Book
11	11.1	Orthonormal Bases; Gram-Schmidt Process	7	Face to Face	Moodle		Exam	Text Book
	11.2	Eigenvalues	1	Face to Face	Moodle		Exam	Text Book
	11.3	Eigenvectors	5	Face to Face	Moodle		Exam	Text Book
12	12.1	Eigenvectors	5	Face to Face	Moodle		Exam	Text Book
	12.2	Diagonalization	5	Face to Face	Moodle		Exam	Text Book
	12.3	Diagonalization	5	Face to Face	Moodle		Exam	Text Book
13	13.1	General Linear Transformations	1	Face to Face	Moodle		Exam	Text Book
	13.2	Examples of Linear Transformations.	5	Face to Face	Moodle		Exam	Text Book
	13.3	Examples of Linear Transformations.	5	Face to Face	Moodle		Exam	Text Book



14	14.1	Kernel of Linear Transformations	7	Face to Face	Moodle		Exam	Text Book
	14.2	Range of Linear Transformations	7	Face to Face	Moodle		Exam	Text Book
	14.3	Matrix of Linear Transformations	5	Face to Face	Moodle		Exam	Text Book
15	15.1	Inverse Linear Transformations	5	Face to Face	Moodle		Exam	Text Book
	15.2	Inverse Linear Transformations	5	Face to Face	Moodle		Exam	Text Book
	15.3	Isomorphism	7	Face to Face	Moodle		Exam	Text Book

## 22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First Exam	20		1+5+7		On Campus
Second Exam	30		1+5+7		On Campus
Final Exam	50		1+5+7		On Campus

## 23 Course Requirements

Each student must have:

- Account on Microsoft Teams

## 24 Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.



## 25 References:

A- Required book (s), assigned reading and audio-visuals:

H. Anton and C. Rorres, Elementary Linear Algebra (11th edition), Wiley, 2015.

B- Recommended books, materials, and media:

1. B. Kolman and D. R. Hill, Elementary Linear Algebra (8th edition), Prentice Hall, 2004.

2. D. Lay, Linear Algebra and Its Applications (3rd edition), Addison-Wesley, 2003.

3. S. J. Leon, Linear Algebra with Applications (6th edition), Prentice Hall, 2002.

## 26 Additional information:

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Name of Course Coordinator: Prof. Hasan Alnajjar	Signature: -----	Date: 4-11-2022
Head of Curriculum Committee/Department: Prof. Ahmad Al Zghoul--	Signature: -----	
Head of Department: -Prof. Manal Ghanem -	Signature: -M. Ghanem	
Head of Curriculum Committee/Faculty: -----	Signature: ----	
Dean: Mahmoud Jaghoub	Signature: -----	