



مركز الاعتماد
وإضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Linear Algebra I

1	Course title	Linear Algebra I
2	Course number	(0301241)
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	(0301102)
5	Program title	B.Sc.
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Science
9	Department	Mathematics
10	Level of course	College requirement
11	Year of study and semester (s)	all Semesters
12	Final Qualification	B.Sc. in Mathematics
13	Other department (s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	1.11.2016

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Emad Abu Osba

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. 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.

19. 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- Intended Learning Outcomes (ILOs):

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding Skills: Student is expected to

- A1. Solve systems of linear equations using the Gauss-Jordan elimination method.
- A2. Compute determinants, and prove the basic theorems about determinants and their properties.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1. Employ matrices to solve systems of linear equations.
- B2. Prove the basic theorems about systems of linear equations and matrices.

C. Subject- Specific Skills: Student is expected to

- C1. Define the concepts of vector spaces, subspaces, linear combinations, and determine spanning sets, linear independence, bases, dimension, row space, column space, null space, rank, and nullity.
- C2. Define the concepts of inner product spaces, and determine norms, angles between vectors, orthogonality, and orthonormal bases.
- C3. Compute the eigenvalues and eigenvectors of matrices, and prove the basic theorems about these concepts.
- C4. Make use of the basic facts about linear transformations and their matrix representations.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

- D1. Use linear algebra concepts to solve real life applications.
- D2. Use linear algebra methods in other branches of mathematics, physics and engineering.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
SYSTEMS OF LINEAR EQUATIONS AND MATRICES <ul style="list-style-type: none"> • Introduction to Systems of Linear Equations • Gaussian Elimination • Matrices and Matrix Operations • Inverses; Rules of Matrix Arithmetic • Elementary Matrices and a Method for Finding A^{-1} • Further Results on Systems of Equations and Invertibility • Diagonal, Triangular, and Symmetric Matrices 	1-3		A1 B1 B2 D1 D2	Quiz Project	
DETERMINANTS <ul style="list-style-type: none"> • Determinants by Cofactor Expansion • Evaluating Determinants by Row Reduction • Properties of the Determinant Function • A Combinatorial Approach to Determinants 	4-6		A2 D1 D2	Quiz Exam	
GENERAL VECTOR SPACES <ul style="list-style-type: none"> • Real Vector Spaces • Subspaces • Linear Independence • Basis and Dimension • Row Space, Column Space, and Nullspace • Rank and Nullity 	7-9		C1	Quiz Exam	
INNER PRODUCT SPACES <ul style="list-style-type: none"> • Inner Products • Angle and Orthogonality in Inner Product Spaces • Orthonormal Bases; Gram-Schmidt Process 	10		C2	Quiz	
EIGENVALUES, EIGENVECTORS	11-12		C3	Project	

<ul style="list-style-type: none"> Eigenvalues and Eigenvectors Diagonalization 					
LINEAR TRANSFORMATIONS <ul style="list-style-type: none"> General Linear Transformations Kernel and Range Inverse Linear Transformations 	13-15		C4 D1 D2	Quiz Project	

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- Class time will be spent on lecture as well as discussion of homework problems and some group work.
- To actively participate in class, you need to prepare by reading the textbook and doing all assigned homework before class (homework will be assigned each class period, to be discussed the following period).
- You should be prepared to discuss your homework (including presenting your solutions to the class) at each class meeting, your class participation grade will be determined by your participation in this.
- You are encouraged to work together with other students and to ask questions and seek help from the professor, both in and out of class.

22. Evaluation Methods and Course Requirements:

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

ILO/s	Learning Methods	Evaluation Methods	Related ILO/s to the program
	Lectures	Exams Quizzes Project	A1, A4, A6, B1, C1, D2

23. Course Policies:

According to university regulations, attendance is mandatory. If a student is unable to attend a class, then he/she should contact the instructor. If a student misses more than 10% of the classes without excuse, then he/she will be assigned a failing grade in class.

In cases of extreme emergency or serious illness, the student will be allowed to make up the missed exams. Times and dates for make up exams will be assigned later.

There are severe sanction for cheating, plagiarizing and any other form of dishonesty. The university regulations on cheating will be applied to any student who cheats in exams or on any homework.

24. Required equipment:

Data Shows

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: Dr. Emad Abu Osba Signature: ----- Date:

1/11/2016

Head of curriculum committee/Department: Dr. Emad Abu Osba Signature: -----

Head of Department: Dr. Baha Alzalg Signature: -----

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature: -----

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Dean: Dr. Sami Mahmood Signature: -----

Copy to:
Head of Department
Assistant Dean for