COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Mathematics			**NQF level**	
Course Title	Linear Algebra \1	**Code**	853241	**Prerequisite**	-
Credit Hours	3	**Theory**	3	**Practical**	-
Course Leader	Dr.Areen Alkhateeb	**email**	Areen.k@jadara.edu.jo		
Lecturers	Dr. Hamzeh Zuriqat Dr. Areen Alkhateeb	**emails**	hamzeh.zu@jadara.edu.jo Areen.k@jadara.edu.jo		
Lecture time	10:00-11:30 Mon-Wed	**Classroom**	**D009-Online**		
Semester	2	**Production**	2021	**Updated**	2022
Awards	-			**Attendance**	Fulltime

Short Description

This course includes the study of Systems of Linear Equations. Solve the system of linear equations by using (Gaussian and Gauss-Jordan elimination). Matrices; their operations and their algebraic properties, Inverse of a matrix and its properties, methods for finding the inverse; solve the system of linear equations by using inverse of a matrix. Determinants with minors and cofactors; solve the system of linear equations by Crammers rule. Vector Spaces, subspaces, linear independence, basis, dimension, Eigenvalues and eigenvectors and their applications.

Course Objectives

- Solve systems of linear equations using various methods including Gaussian and Gauss-Jordan elimination and inverse matrices.
- Perform matrix algebra, invertibility, and transpose and understand vector algebra.
- Determine relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices.
- Define special matrices: diagonal, triangular and symmetric.
- Understand determinants and their properties.
- Understand real vector spaces and subspaces and apply their properties.
- Understand linear independence and dependence.
- Find basis and dimension of a vector space, and understand change of basis.
- Find the dimension of spaces such as those associated with matrices and linear transformation.

Learning Outcomes
A. Knowledge - Theoretical Understanding
a1) Solve systems of linear equations using various methods including Gaussian and Gauss-Jordan elimination and inverse matrices. a2) Understand and apply the operations and their algebraic properties of the Matrices, Inverse of a matrix and its properties, methods for finding the inverse; solve the system of linear equations by using inverse of a matrix. Determinants with minors and cofactors; solve the system of linear equations by Crammers rule.
B. Knowledge - Practical Application
a3) Exhibit knowledge of Vector Spaces, subspaces, linear independence, basis, dimension, Eigenvalues and eigenvectors and their applications. b1) Find the solution of systems of linear equations using various methods including Gaussian, Gauss-Jordan elimination, inverse matrices and Crammers rule.
C. Skills - Generic Problem Solving and Analytical Skills
b2) Determinants the Inverse of a matrix and its properties, methods for finding the inverse; Matrices; their operations and their algebraic properties. Determinants with minors and cofactors.
D. Skills - Communication, ICT, and Numeracy
b3) find Vector Spaces, subspaces, linear independence, basis, dimension, Eigenvalues and eigenvectors and their applications.
E. Competence: Autonomy, Responsibility, and Context
Teaching and Learning Methods
• E-learning. • Distance learning using (Microsoft Teams). • Problem based learning (PBL), • Direct students to self-learning through textbooks, library, e-library, and research papers. • Tutorials, and discussion.
Assessment Methods
Assignments, Exams, Quizzes, Discussion and Interaction

Course Contents					
W	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	a1	Introduction to system of linear equation.	Lecturing, examples, Discussion.	Discussion and Interaction
2.	3	a1,b1	Gaussian Elimination.	Lecturing, examples, Discussion.	Discussion and Interaction
3.	3	a1,b1	Gaussian Jordan Elimination.	Lecturing, examples Discussion.	Participation
4.	3	a2,b2	Matrices and Matrices Operations.	Lecturing, examples Discussion.	Participation

5.	**3**		Rules of Matrix Arithmetic.	Lecturing, examples Discussion.	Discussion and Interaction
6.	**3**	**a2, b1, b2**	The Inverse of Matrix.	Lecturing, examples Discussion.	Discussion and Interaction
7.	**3**	**a1, a2, b1, a2, b2b2**	Elementary Matrix and Method for finding Inverse.	Lecturing, oral discussion	Participation
8.	**3**	**a2,b1, b2**	Solve the System of Linear Equations by using Inverse.	Lecturing, oral discussion	Participation
9.	**3**	**b2**	Determinant with Minors and Cofactors.	Lecturing, examples	Discussion and Interaction
10.	**3**	**a2, b2**	Evaluating Determinant by Row Reduction.	Lecturing, examples	Discussion and Interaction
11.	**3**	**a2, b2**	Crammers Rule.	Lecturing, examples	Discussion and Interaction
12.	**3**	**a3, b3**	Real Vectors Spaces, Subspaces.	Lecturing, oral discussion	Discussion and Interaction
13.	**3**	**a3,b1, b3**	Linear combination, Linearly Independence	Lecturing, oral discussion	Discussion and Interaction
14.	**3**	**a3,b1, b3**	Basis and Dimension.	Lecturing, examples	Cooperative learning
15.	**3**	**a3,a1,b1, b3**	Eigenvalues, Eigenvectors.	Lecturing, examples	Cooperative learning
16.			Final Exam		Exam

Infrastructure	
Textbook	Elementary Linear Algebra by H.Anton….12th Edition.
References	1-Introduction to Linear Algebra, by P.V.O'Neil. 2-Linear Algebra, by Fraleighand Beauregard. 3-Introductory Linear Algebra with Applications by B. Kolman.
Required reading	
Electronic materials	
Other	

Course Assessment Plan							
Assessment Method	**Grade**	**CLOs**					
		a1	**a2**	**a3**	**b1**	**b2**	**b3**
First (Midterm)	**30%**	8	7	0	7	8	0
Second (if applicable)							
Final Exam	**50%**	5	9	12	7	9	8
Coursework	**20%**						
Coursework assessment methods — Assignments							
Case study	-						
Discussion and interaction	**-**						
Group work activities	-						
Lab tests and assignments	-						
Presentations	-						
Quizzes	**10%**	2	3		5	5	5
Total	**100%**						

Plagiarism

Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).

Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.

Dr. Sara Khalil

Dr Ayman Hazaymeh