



# Course Specification

— (Bachelor)

Course Title: **Linear Algebra**

Course Code: **202262-3**

Program: **Bachelor in Computer Science**

Department: **Department of Computer Science**

College: **College of Computers and Information Technology**

Institution: **Taif University**

Version: **V1.2024**

Last Revision Date: **01/02/2024**



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## A. General information about the course:

### 1. Course Identification

1. Credit hours: (3)

2. Course type

A.  University  College  Department  Track  Others  
B.  Required  Elective

3. Level/year at which this course is offered: ( 5/3)

4. Course general Description:

This course is an introduction to Linear Algebra during a study of linear systems of equations and its solutions methods, and a study of Matrices, determinants, operations on matrices and Eigenvalues and Eigenvectors. Finally, a simple introduction to Vector spaces.

5. Pre-requirements for this course (if any):

NON

6. Pre-requirements for this course (if any):

None

7. Course Main Objective(s):

Understand the linear systems of equations and its solutions methods, understand the matrices and the operations on matrices, understand the determinants and its properties and defining the vector space and understand the properties of the vector space  $R^2$  and  $R^3$

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	E-learning	0	0
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>	0	0
4	Distance learning	0	0



### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
<b>Total</b>		<b>45</b>

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
<b>2.0</b>	<b>Skills</b>			
1.1	Solve the system of linear equations by using Gauss-Jordan method.	S1	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.2	Performs operations on matrices addition multiplication and finding the inverse of a matrix.	S1	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.3	Use the properties of determinants to calculate the value of the determinants.	S1	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.4	Express a vector as a linear combination of	S1	Lecture	Written Exams



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	some vectors in the space $R^2$ and $R^3$ .		Discussion Problem Solving	Quizzes Assignments
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction to linear systems the method of elimination.	3
2	Matrices and Gaussian Elimination. {Definition of a matrix the coefficient matrix of a linear system the elementary row operations Row equivalent matrices	3
3	GaussJordan Elimination. {Reduced echelon matrix Gauss Jordan Elimination method}	3
4	Matrix operations {addition, multiplication by a number, and multiplication rules of matrix arithmetic}	3
5	Inverses of matrices {identity matrix definitions of invertible nonsingular matrix, inverse matrix, and noninvertible singular matrix arbitrary integral	3
6	Determinants {determinants of $2 \times 2$ matrices higher order determinants, definitions of minors, cofactors, and $n \times n$ determinants properties of determinants}	6
7	Determinants and elementary row operations.	3
8	Cramer's Rule and inverse matrices {Cramer's Rule the adjoint matrix finding the inverse of a matrix by determinant and the adjoint matrix}	6
9	Vectors in the plane and in space The Vector space $R^2$	3
10	The Vector space $R^3$	6
11	Eiegen values and Eiegen vector {the definition of Eiegen values and Eiegen vector Characteristic equation of a Matrix algorithm to finding the eigenvalues and associated eigenvectors of $n \times n$ matrix}	3
12	Diagonalization of matrices.	3





Items	Resources
<b>Technology equipment</b> (projector, smart board, software)	•
<b>Other equipment</b> (depending on the nature of the specialty)	•

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	<ul style="list-style-type: none"> <li>• Students</li> <li>• Faculty members</li> <li>• Coordinator</li> <li>• Council</li> <li>• Curriculum Committees</li> </ul>	<ul style="list-style-type: none"> <li>• Course exit survey</li> <li>• Feedback from Faculty members</li> <li>• Feedback from Course Coordinator</li> <li>• Feedback from council</li> <li>• Feedback from Curriculum Committees</li> </ul>
Effectiveness of Students assessment	<ul style="list-style-type: none"> <li>• Students</li> <li>• Faculty members</li> <li>• Coordinator</li> <li>• Council</li> <li>• Curriculum Committees</li> </ul>	<ul style="list-style-type: none"> <li>• Course exit survey</li> <li>• Feedback from Faculty members</li> <li>• Feedback from Course Coordinator</li> <li>• Feedback from council</li> <li>• Feedback from Curriculum Committees</li> </ul>
Quality of learning resources	<ul style="list-style-type: none"> <li>• Students</li> <li>• Faculty members</li> <li>• Coordinator</li> <li>• Council</li> <li>• Curriculum Committees</li> </ul>	<ul style="list-style-type: none"> <li>• Course exit survey</li> <li>• Feedback from Faculty members</li> <li>• Feedback from Course Coordinator</li> <li>• Feedback from council</li> <li>• Feedback from Curriculum Committees</li> </ul>
The extent to which CLOs have been achieved	<ul style="list-style-type: none"> <li>• Students</li> <li>• Faculty members</li> <li>• Coordinator</li> <li>• Council</li> <li>• Curriculum Committees</li> </ul>	<ul style="list-style-type: none"> <li>• Course exit survey</li> <li>• Feedback from Faculty members</li> <li>• Feedback from Course Coordinator</li> <li>• Feedback from council</li> <li>• Feedback from Curriculum Committees</li> </ul>
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)





## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	<b>CS COUNCIL</b>
<b>REFERENCE NO.</b>	<b>MEETING #11</b>
<b>DATE</b>	<b>07/03/2024</b>

