



# Course Specification

— (Bachelor)

Course Title: **Linear Algebra 1**

Course Code: **MTHS211**

Program: : **Applied Statistics & Data Management**

Department: **Mathematics**

College: **College of Science**

Institution: **Majmaah University, Saudi Arabia**

Version: **2023**

Last Revision Date: **27/9/2023**



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## A. General information about the course:

### 1. Course Identification

1. Credit hours: (3(2+2) )

#### 2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: ( 4TH.)

#### 4. Course general Description:

Recognize Matrices and their operations- Types of matrices - Elementary transformations -Determinants- elementary properties of determinants- Inverse of a matrix- Rank of matrix -Linear systems of equations. Define Vector spaces- Linear independence - Finite dimensional spaces - Linear subspaces -Linear dependence and independence, basis and dimension (also, in subspaces), rank of a matrix, linear equations of vector spaces, coordinates. Reproduce and State Methods Linear mappings- Kernel and image of a linear mapping - Describe Eigenvalues and eigenvectors of a matrix and of a linear operator mapping

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

): MTHS 122 Discrete Mathematics

#### 6. Co-requisites for this course (if any):

NA

#### 7. Course Main Objective(s):

- Studying matrices, determinants and operations on them
- Solving system of homogeneous and non-homogeneous linear equation
- Studying vector spaces, subspaces and their properties
- Solving system of homogeneous and non-homogeneous linear equation
- Have the knowledge of Linear operators and how to give it in a matrix form
- Have the knowledge of Eigen values and eigenvectors of a matrix and their properties
- Studying of diagonalization and similar matrices

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

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	50%
2	E-learning		





No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>	30	50%
4	Distance learning		

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

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	
5.	Others (specify)	
<b>Total</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>			
1.1	Reproduce fundamentals and concepts of matrix theory and vector spaces, linear operators, Eigen values and eigenvectors	K4	<b>Direct teaching:</b> Inquiry-based instruction Power and Points and discussions	<ul style="list-style-type: none"> <li>Homework</li> <li>Quiz</li> <li>Midterms</li> <li>Final Exams</li> <li>E-exam</li> <li>Oral Exam</li> </ul>
1.2	The students will explain and interpret a general knowledge of linear algebra such as Demonstrate the intersection of subspaces	K4	<b>Aimed teaching:</b> Discovery and oral questions	



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	.Demonstrate the Fundamental theorem of linear algebra			
...				
<b>2.0</b>	<b>Skills</b>			
2.1	Acquire linear algebraic knowledge and skills.	S2		<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>Final Exams</li> </ul>
2.2	Solving system of homogeneous and non-homogeneous linear equation	S4		
...				
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1				
3.2				
...				

### C. Course Content

No	List of Topics	Contact Hours
1.	Matrices and their operations- Types of matrices- Elementary transformations	8
2.	Determinants-elementary properties of determinants	6
3.	Inverse of a matrix	6
4.	Linear systems of equations .	8
5.	Vector spaces- Finite dimensional spaces - Linear subspaces	6
6.	Linear dependence and independence, basis and dimension (also, in subspaces) ‘	6
7.	rank of a matrix, linear equations of vector spaces, coordinates	4
8.	Linear mappings -	6
9.	Kernel and image of a linear mapping	4
10.	Eigenvalues and eigenvectors of a matrix and of a linear operator mapping .	6
<b>Total</b>		<b>60</b>





## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid exam	7 th	20
2.	Homework	Through of semester	10
3.	Midretm2	Week12	20
4.	E.exam	9 th	10
5.	Final exam	End of semester	40

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

<b>Essential References</b>	1) Elementary Linear Algebra with Applications, Francis G. Florey.
<b>Supportive References</b>	Elementary Linear Algebra 11th edition, Howard Anton, Amazon, 2011.
<b>Electronic Materials</b>	<a href="http://joshua.smcvt.edu/linearalgebra">http://joshua.smcvt.edu/linearalgebra</a> <a href="http://faculty.mu.edu.sa/azedan/Algebra">http://faculty.mu.edu.sa/azedan/Algebra</a> <a href="http://mathforum.org/advanced/numerical.html/">http:// mathforum.org/advanced/numerical.html/</a> <a href="http://www.ingentaconnect.com/content/">http://www.ingentaconnect.com/ content/</a> <a href="http://www.zentrablblatt-math.org/zmath/en/">http://www.zentrablblatt-math.org/ zmath/en/</a>
<b>Other Learning Materials</b>	

### 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with capacity of 30-students.
<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	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Effectiveness of Students assessment	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)
The extent to which CLOs have been achieved		
Other		

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

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	
<b>REFERENCE NO.</b>	
<b>DATE</b>	

