Course Specification
— (Bachelor)

Course Title: **Linear Algebra**

Course Code: **2022204-3**

Program: **Bachelor in Mathematics**

Department: **Department of Mathematics and Statistics**

College: **Faculty of science**

Institution: **Taif university**

Version: **1**

Last Revision Date: 20/05/2023

Table of Contents

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: (4th level/Second year)

4. Course general Description:

This course develops fundamental algebraic tools, such as Determinants and Matrices (proprieties and operations), Systems of linear equations, Homogeneous Systems of linear equations, Vector spaces, Subspaces, Linear independence of set of vectors, Bases and Dimension of a vector space, Row space, Column space, Null space, Linear transformations, Kernel and Range of a linear transformations, Associated Matrix of a linear transformation, Eigenvalues and Eigenvector, Diagonalization, including fundamental theorems and useful examples.

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

Introduction to mathematics (202112-3)

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

None

7. Course Main Objective(s):

The student will be taught as follows:
1. **Introducing the concepts and importance of linear algebra;**
2. **Describing the ability to solve problems using linear algebra and, implementing linear algebra to other fields both within and without mathematics.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**3Hr /Week**	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)**	NA
Total		45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize fundamentals of Determinants and Matrices and how to use them professionally in linear algebra.	K1	• Interactive classes • Self-learning through the website • Arich variety of mathematical tasks and projects	• Quizzes • Assignments
1.2	Identify and solve mathematical properties on linear transformations and its types.	K1	• Interactive classes • Self-learning through the website • A rich variety of mathematical tasks and projects	• Exams • Assignments
...				
2.0	**Skills**			
2.1	Apply appropriate properties of the Determinants and Matrices to prove and solve some principles, theorems, formulas and problems on linear algebra.	S1	• Interactive classes • Group discussions	• Quizzes • Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Explain the type of given linear transformation and finding its eigen values and its egien vectors.	S1	• Lectures • Group discussions	• Exams • Quizzes
2.3	Use computing knowledge, skills and mathematical packages in information analysis and suggestion of solutions.	S3	• Lectures • Self-learning through the website	• Exams • Quizzes • Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate act responsibility and ethically in conducting their work	V3	• Lectures	• Exams • Quizzes

C. Course Content

No	List of Topics	Contact Hours
1	Introduction	3
2	Determinants	3
3	Matrices (proprieties and operations),	3
4	Methods of Solving System of linear equations,	6
5	Homogenous system of linear equations	3
6	Vector Spaces and Subspaces.	3
7	Linear independence and dependence of vectors	3
8	Basis, Dimension.	3
9	Change coordinates in different basis.	3
10	Row space, Column Space and Null Space.	3
11	Linear transformations, Kernel.	3
12	Range of a linear transformation, Associated Matrix of a linear transformation.	3
13	Eigenvalues and Eigenvectors.	3
14	Diagonalization.	3
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Continuous Evaluation	10 %
2.	Assignments, report	Continuous Evaluation	10 %
3.	Midterm 1 Exam	8-9	15%
4.	Midterm 2 Exam	12-13	15%
5.	Final Exam	15-16	50%

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

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Kwak and Hong, Linear Algebra, 2nd Edition, Springer, 2004.
Supportive References	H. Anton and C. Rorres, Elementary Linear Algebra, 11th Edition, Jon Wiley & Sons, New York., 2014. (Online).
Electronic Materials	Presentations sent to students via Blackboard.
Other Learning Materials	Lecturers from YouTube, prepared by Dr. Salah El Nafaey, (see the following link), https://www.youtube.com/watch?v=OzNfAQYstyE&list=PLp5QO1iuiUkNtvLwjssJYyQ3WbS9S8s2V

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers
Technology equipment (Projector, smart board, software)	Laptop and projector
Other equipment (Depending on the nature of the specialty)	Wi-Fi internet connections

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct & Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of students assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct & Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	4
DATE	October 2023

قسم الرياضيات والإحصاء
Mathematics and Statistics Department

جامعة الطائف
TAIF UNIVERSITY