Course Specifications

Course Title:	Linear Algebra (2)
Course Code:	262Math-3
Program:	Mathematics
Department:	Mathematics
College:	College of Science and Arts
Institution:	Najran University

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A. Course Identification

1. Credit hours: 3(3+0)		

2. Course type

a. University ☑ College ☐ Department ■ Others ☐

b. Required ■ Elective ☐

3. Level/year at which this course is offered: Level 4/ Second year

4. Pre-requisites for this course (if any): 111-Math-3

5. Co-requisites for this course (if any): 161-Mathe-3

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	٣	100 %
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (Exams)	3
	Total	48
Other Learning Hours*		
1	Study	35
2	Assignments	10
3	Library	
4	Projects/Research Essays/Theses	
5	Others(0.h)	15
	Total	108

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

- Vectors (Vectors and their properties in two and three dimensions, Vector spaces, subvector spaces, Row Spaces and Column Spaces, Null matrix, Linear combinations, Linear independence of Vectors, Basis and dimension).

- Inner product space (Definition of inner product, Orthogonality, Standard basis)

- Linear transformations (common types of transformation, Kernel and Range of Linear Transformation, Matrix of A linear Transformation, Order of Matrix, Similarity of two Matrices, Eigenvalues and Eigenvectors for Matrix of linear Transformation, Transforming a matrix to diagonal matrix(symmetric matrix diagonalizable))

2. Course MainObjective

The main purpose for this course is to introduce the following concepts.

- Vector in two and three dimensions
- Vector space and inner product space
- Linear transformations
- Diagonalization of matrices.

3. Course Learning Outcomes

	CLOs	AlignedPLOs
1	**Knowledge::**Upon successful completion of this course students will be able to:	
1.1	recognize vector in two and three dimensions	
1.2	define vector spaces and their subspaces, and state their main properties	
1.3	define inner product spaces and the orthogonality	
1.4	define linear transformations and their kernels and ranges, and state their main properties.	
1.5	describe eigenvalues and eigenvectors of a matrix and state their main properties.	
1.6	Define diagonalizability of a matrix and recall its conditions	
2	**Skills :**Upon successful completion of this course students will be able to:	
2.1	determine whether a given set is a vector space	
2.2	decide whether a set of vectors forms a basis for a vector space, and determine the dimension of a vector space	
2.3	determine the eigenvalues and eigenvectors of a given linear transformation or matrix and decide whether it is diagonalizable	
2.4	decide whether a set of vectors is linearly independent or dependent.	
2.5	Compute linear transformations, kernel and range.	
3	**Competence:**	
3.1	Self-learning	
3.2	Project Interactive classes	
3.3	Teamwork and competitions	
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Vectors:	
1.1	Vector in two and three dimensions and their basic properties	
1.2	Vector spaces and subspaces and their basic properties	
1.3	Row Spaces and Column Spaces, Null matrix (zero matrix)	
1.4	Linear combinations and Linear independence of Vectors,	
1.5	Basis and dimension	
2	Inner product:	
2.1	Definition of inner product and its properties	
2.2	Inner product space	
2.3	Orthogonality and standard basis	
3	Linear transformations	
3.1	Common types of transformation, Kernel and Range	
3.2	Matrix of A linear Transformation, Order of Matrix, Similarity of two Matrices	
3.3	Eigenvalues and Eigenvectors for Matrix of linear Transformation	
3.4	Transforming a matrix to diagonal matrix(symmetric matrix diagonalizable)	
	Total	

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
1.0	**Knowledge**		
1.1	recognize vector in two and three dimensions	Lecture	
1.2	define vector spaces and their subspaces, and state their main properties	Lecture	
1.3	define inner product spaces and the orthogonality	Lecture	
1.4	define linear transformations and their kernels and ranges, and state their main properties.		
1.5	describe eigenvalues and eigenvectors of a matrix and state their main properties.		
1.6	Define diagonalizability of a matrix and recall its conditions		
2.0	**Skills**		
2.1	determine whether a given set is a vector space		
2.2	decide whether a set of vectors forms a basis for a vector space, and determine the dimension of a vector space		
2.3	determine the eigenvalues and eigenvectors of a given linear transformation or matrix and decide whether it is diagonalizable		
2.4	decide whether a set of vectors is linearly independent or dependent.		
2.5	Compute linear transformations, kernel and range.		
3.0	**Competence**		
3.1	Prove basic results in linear algebra (2) using appropriate proof-writing techniques such as		

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
	linear independence of vectors, properties of subspaces, linearity, injectivity and surjectivity of linear transformation and properties of eigenvectors and eigenvalues		
3.2	Self-learning Project Interactive classes ,teamwork, competitions		
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	1st midterm Exam	7th week	20
2	2nd midterm Exam	11TH week	20
3	Assignments & Quizzes	During classes	10
4	Final Exam	At the end	50
5			
6			
7			
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:
- Office hours weekly.
- Blackboard

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	
Essential References Materials	
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration	

Item	Resources
rooms/labs, etc.)	
Technology Resources (AV, data show, Smart Board, software, etc.)	
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality oflearning resources, etc.)

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

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	