Course Specification
(Bachelor)

Course Title:	Linear Algebra
Course Code:	Math 632
Program:	Mathematics Post Graduate Studies
Department:	Mathematics
College:	College of Science and Humanities
Institution:	Prince Sattam Bin Abdulaziz University
Version:	Version 1
Last Revision Date:	Jan 2025

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: (Post Graduate)					
4. Course General Description:					
Linear functional and dual spaces, Canonical form of linear transformations, Jordan and rational forms, Multilinear forms, Hermitian, unitary and normal transformations, Tensor product of vector spaces. Course Description					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
Objectives : Become fully conversant with all basic concepts of Linear Algebra such as Linear Functionals, Linear Transformation, Vector Spaces and associated theorems and results and able to apply to solve mathematical problems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures (16 X 3)**	48

2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		48

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	**Gain knowledge through examples and counter examples of Linear functionals, dual spaces, linear transformation and canonical forms of linear transformation and tensor products.**	**K1**	**Application oriented exercise during lectures and tutorials**	1. Two Internal Exams 2.At least two Quiz 3.End Semester Exam
1.2	**Recall and reproduce the properties and theorems in Linear functionals, dual spaces, linear transformation and canonical forms of linear transformation and their applications**	**K3**		
2.0	**Skills**			
2.1	**Be able to prove theorems, solve problems and give counter examples of Linear functionals, dual spaces, linear transformation and canonical forms of linear transformation and tensor products.**	**S1**	**Application oriented exercise during lectures and tutorials**	1. Two Internal Exams 2.At least two Quiz 3.End Semester Exam
2.2	**Be able to prove theorems, solve problems and give counter examples about Linear functionals, dual spaces, linear transformation and canonical forms of linear transformation and their applications**	**S1**		
3.0	**Values, autonomy, and responsibility**			
3.1	Work independently and in group	**V1**	**Group Discussion Task**	**Oral Presentation Continuous Assessment**

C. Course Content

No	List of Topics	Contact Hours
1.	Vector Spaces and Subspaces	3
2.	Basis and Dimension.	3
3.	Linear Maps.	3
4.	Matrix Representation.	3
5.	Sums and Direct Sums.	3
6.	Quotient Spaces.	3
7.	Discussion, First exam.	3
8.	Dual Spaces.	3
9.	Free Vector Spaces.	3
10.	Multilinear Maps and Tensor Products .	3
11.	Diagonalization	3
12.	Jordan Canonical Forms	3
13.	Bilinear and Sesquilinear Forms	3
14.	Discussion ,Second exam	3
15.	Inner Product Spaces an operators on inner product spaces.	3
16.	Revision and discussions	3
	Total	48

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Term Exam I	6	15%
2.	Quiz (Atleast 2 quiz)	4 & 10	10%
3.	Mid Term Exam II	13	15%
4.	Continuous Assessment, Homework, Assignment, Attendance etc.	Every week	10%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
5.	End Semester Exam	17	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	1. Sheldon Axler, Linear Algebra Done Right, 4th edition, 2 January 2025. 2. **Saudi Digital Library**.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• A classroom or lecture hall with whiteboard for 25 students. • A digital circuits laboratory.
Technology equipment (projector, smart board, software)	• A digital image projection system with connection to desktop computer and laptop computer. • High speed Internet connection. • An instructor computer station.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Graduates	Course Evaluation and Program Evaluation Survey (Indirect)
Effectiveness of Students assessment	Program Leaders	Peer review (Direct)
Effectiveness of students' assessment	Students	Indirect
Quality of learning resources	Students, Graduates	Indirect (Program

Assessment Areas/Issues	Assessor	Assessment Methods
		Evaluation and Alumni Survey)
Other	Faculty	Indirect (Survey)

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	**OCT 2024**