هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA
T4
2020

Course Specifications

Course Title:	**Matrix Algebra**
Course Code:	**Math 106**
Program:	**Mathematics**
Department:	**Mathematics**
College:	**Science**
Institution:	**Jazan University**

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A. Course Identification

1. Credit hours:
2. Course type **a.** University ☐ College ☑ Department ☐ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level 2/Year 1
4. Pre-requisites for this course (if any)**: 212 Math**
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	45	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	42
2	**Laboratory/Studio**	
3	**Tutorial**	3
4	**Others** (specify)	
	Total	**45**

B. Course Objectives and Learning Outcomes

1. Course Description

- **Concept of matrix,** rank of matrix, types of matrices, basic algebraic operations on matrices, inverse of square matrix $A_{2\times2}$ and$A_{3\times3}$.
- **Determinants** and their properties and methods of calculation.
- **Linear equation system** homogenous and non-homogeneous.
- **Solving methods Linear equation systems**: Gauss method, simple row method, Cramer's Rule.
- **Eigenvalues and Eigenvectors of matrices.**
- **Linear Space and subspace.**

2. Course Main Objective

After finishing the course, the student is expected to be familiar with the followings:

- Matrices and algebraic operations.
- Linear equation systems and its solutions.
- Linear space and subspace and its examples.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Distinguishing mathematical concepts relevant to Matrices and Matrix Operations, Definitions and its Properties, Types of Matrices, Operations on Matrices (Addition- Subtraction-Multiplication), Linear Combinations, Transpose and Trace.	K1
1.2	Identify background science, features and structures of Mathematics problems in Inverses. Rules of Matrix Arithmetic, Properties of Matrix Operations, Inverse of 2 by 2 Matrix and its properties, Powers of a Matrix, Matrix polynomial.	K2
1.3	Explain notations and concepts required for the solution of basic Elementary Matrices and a Method for Finding A^{-1}: Elementary Matrices and Row Operations, Using Row Operations to Find A^{-1}..	K3
2	**Skills :**	
2.1	Apply theoretical, computational or practical aspect relevant to basic Diagonal, Triangular and Symmetric Matrices.	S1
2.2	Compute numerical quantities for various parameters to approximate the solution in Linear Equations and Consistent and inconsistent linear systems.	S2
2.3	Apply various mathematical rules, techniques and theorems in Application in Gaussian Elimination and Gauss–Jordan elimination, .linear equations , A Basic Theorem, Elementary Row Operations.	S3
2.4	Solve mathematical problem using critical thinking for Vector Space Axioms, examples and exercises.	S4
3	Values:	
3.1	Cultivate a mathematical attitude and nurture the interest.	V1
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.	V2
3.3	Inculcating values and ethics in thought, expression and deed.	V3

C. Course Content

No	List of Topics	Contact Hours
1	**Matrices and algebraic operations.**	**15**
2	**Inverses. Rules of Matrix Arithmetic**	**15**
3	**Elementary Matrices and a Method for Finding A-1**	**6**
4	**Diagonal, Triangular and Symmetric Matrices**	**3**

5	Systems of Linear Equations	3
6	Determinants and Vector Space	3
Total		45

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Distinguishing mathematical concepts relevant to Matrices and Matrix Operations, Definitions and its Properties, Types of Matrices, Operations on Matrices (Addition-Subtraction-Multiplication), Linear Combinations, Transpose and Trace.	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.2	Identify background science, features and structures of Mathematics problems in Inverses. Rules of Matrix Arithmetic, Properties of Matrix Operations, Inverse of 2 by 2 Matrix and its properties, Powers of a Matrix, Matrix polynomial.		
1.3	Explain notations and concepts required for the solution of basic Elementary Matrices and a Method for Finding A^{-1}: Elementary Matrices and Row Operations, Using Row Operations to Find A^{-1}..		
2.0	**Skills**		
2.1	Apply theoretical, computational or practical aspect relevant to basic Diagonal, Triangular and Symmetric Matrices.	Lectures, problem solving, web based work, Classroom dissections.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Compute numerical quantities for various parameters to approximate the solution in Linear Equations and Consistent and inconsistent linear systems.		
2.3	Apply various mathematical rules, techniques and theorems in Application in Gaussian Elimination and Gauss–Jordan elimination, .linear equations , A Basic Theorem**,** Elementary Row Operations.		
2.4	Solve mathematical problem using critical thinking for Vector Space Axioms, examples and exercises.		
3.0	**Values**		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.1	Cultivate a mathematical attitude and nurture the interest.	Group work, problem solving, web based work	Assignments
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.		
3.3	Inculcating values and ethics in thought, expression and deed.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework	3	5%
2	First exam.	7	20%
3	Second exam.	13	20%
4	Homework	14	5%
5	Final exam.	16	50%

***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 :

Each group of students assigned to a member of staff who will be available for help and academic guidance office hours at specific hours on daily basis. At least be available 8 hours per week.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Howard Anton and Chris Rorres, *Elementary Linear Algebra*, 9th Edition, 2005. .
Essential References Materials	• Precalculus, Custom Edition Barnett, Ziegler and Bylenn, McGraw Hill, (2009). • Algebra and Trigonometry,R.E.Larson, R.P. Hostetler, 6th Edition, Houghton Mifflin Company, (2004). • College Algebra and Trigonometry, R. Aufmann, V. Baker and R.Nation, 4th Edition, Houghton Mifflin Company,(2003).
Electronic Materials	- Electronic lectures in Mathematics at www.Google.com.
Other Learning Materials	-Mathematics programs :MATLAB, Maple, Mathematica.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom, Computer lab.
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show; Smart Board, Mathematics software.
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
Effectiveness of teaching	Students, Peer and program leader	Indirect (Course Evaluation Survey)- Indirect peer evaluation
Assessment	Students, Program assessment committee	Direct/ Indirect
Extent of achievement of course learning outcomes	Instructor	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Board Of Mathematics Department
Reference No.	12th Meeting Of The Board Of Mathematics Department 1443-1444
Date	2/6/1443 A. H.; 5/1/2022 A. D