

MODULE DESCRIPTION FORM

Module Information			
Module Title	Linear algebra		Module Delivery
Module Type	Optional		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	COE212		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	3
Administering Department	Artificial Intelligence Eng.		College
Module Leader	Sarmad Kadhim Alkhfaji		e-mail
Module Leader's Acad. Title	Asst. Lec.		Module Leader's Qualification
Module Tutor	ZAINAB ABDULKADHIM NAJM		e-mail
Peer Reviewer Name			e-mail
Scientific Committee Approval Date	27/9/2025		Version Number
			1.0

Relation with other Modules			
Prerequisite module	COE123	Semester	4
Co-requisites module	NONA	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introduction to Linear Algebra, System of linear equations. - vector algebra Vector space – Subspaces-Linear combination Linear independence Bases and Dimension Coordinates and Change of Bases Linear Transformations The Space of Linear Transformations Convexity Affine Sets Matrix of Linear Transformations Change of Bases and Normal Forms Vector space. - Subspaces -Linear combination Linear independence Bases and Dimension



Module Learning Outcomes	Knowledge	A2	A2.1: Define the fundamental concepts of linear algebra, linear combinations, linear independence, bases, and dimension of vector spaces. A2.2: Demonstrate the ability to determine coordinates of vectors relative to different bases and perform change of bases between coordinate systems. A2.3: Apply the principles of linear combinations and linear independence to determine the relationships among vectors.
		Skills	B1
	B2		B2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	Ethics	C1	C2.1 Recognize professional and ethical responsibility. C1.2 Adhere and respect diversity.
Indicative Contents	Indicative content includes the following. Unit 1: Vector Spaces – Definition, Properties, and Examples – Subspaces and their Characteristics – Linear Combination and Span of Vectors. [8 hours] Unit 2: Linear Independence and Dependence – Bases and Dimension – Coordinates and Change of Bases. [8 hours] Unit 3: Linear Transformations – Kernel and Image – The Space of Linear Transformations – Matrix Representation of Linear Transformations. [8 hours] Unit 4: Change of Bases and Normal Forms – Eigenvalues and Eigenvectors – Diagonalization – Applications of Normal Forms. [6 hours] Unit 5: Convexity and Affine Sets – Geometric Interpretations – Applications in Optimization and Vector Spaces. [6 hours]		
Learning and Teaching Strategies			
Strategies	• Presentations • Discussions • Tutorial and graphics • Problem solving • Brain storming • Research and reporting • Problem Solving • Report & discussion assessment		
Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5.2



Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	Vector Spaces and Subspaces	
Week 2	Definition, Properties, Examples	A2, B1, B2, C1
Week 3	Linear Combination of Vectors	A2, B1, B2, C1
Week 4	Linear Independence	A2, B1, B2, C1
Week 5	Bases and Dimension	A2, B1, B2, C1
Week 6	Coordinates and Change of Bases	A2, B1, B2, C1
Week 7	Linear Transformations	A2, B1, B2, C1
Week 8	The Space of Linear Transformations	A2, B1, B2, C1
Week 9	Matrix Representation of Linear Transformations.	A2, B1, B2, C1
Week 10	Mid -term EXAM	A2
Week 11	Convexity and Affine Sets	A2, B1, B2, C1
Week 12	Geometric Interpretation and Applications	A2, B1, B2, C1
Week 13	Change of Bases and Normal Forms	A2, B1, B2, C1
Week 14	Applications of Normal Forms in Linear Transformations	A2, B1, B2, C1
Week 15	Rubric Exam Preparatory week before the final Exam	A2, B1, B2, C1



Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	A2
	Assignments	2	10% (10)	2, 4,6,8,10,12 and 14	A2
	Projects /				
	Report	1	10% (10)	13	A2,B1,B2
Summative assessment	Midterm Exam	1hr	10% (10)	7	A2
	Final Exam	3hr	50% (50)	15	A2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)	
المناهج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	



Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Lay, David C, Steven R. Lay, and Judi J. McDonald. "Linear algebra and its applications 2016	Yes
Recommended Texts	1. Linear Algebra and Its Applications – Gilbert Strang 2. Introduction to Linear Algebra – Gilbert Strang 3. Linear Algebra Done Right – Sheldon Axler	No
Websites	https://eng.alayen.edu.iq//colleges/e/42	

Grading Scheme				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

