



Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Engineering for Artificial
Intelligence Technology
Department of Cybersecurity Engineering



الملحق ٤: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Linear Algebra		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	CSE 207		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	2	Semester of Delivery	
Administering Department	Cybersecurity Eng.	College	College of Artificial Intelligence Engineering Technology
Module Leader	Ali N. Albu-Rghaif	e-mail	ali.alburghaif@uodiyala.edu.iq
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	14/05/2026	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	E 102	Semester	2
Co-requisites module	None	Semester	



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	By the end of this module, students will be able to: 1. Understand the fundamental concepts of linear algebra and vector spaces. 2. Apply vector and matrix operations to solve mathematical and computational problems. 3. Analyze systems of linear equations using algebraic techniques. 4. Understand linear transformations and their properties. 5. Compute eigenvalues and eigenvectors and interpret their applications. 6. Apply linear algebra concepts in computing, data analysis, engineering, and cybersecurity-related fields. 7. Develop analytical and problem-solving skills using linear algebraic methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students should be able to: 1. Explain the basic principles and terminology of linear algebra. 2. Perform vector operations and analyze vector spaces. 3. Apply matrix operations and solve systems of linear equations. 4. Determine linear independence, basis, dimension, and rank. 5. Analyze linear transformations and their associated matrices. 6. Compute eigenvalues and eigenvectors of matrices. 7. Apply orthogonality and inner product concepts. 8. Relate linear algebra concepts to applications in computing and data analysis.
Indicative Contents المحتويات الإرشادية	• Introduction to Linear Algebra • Vectors and Vector Operations • Review of Matrices and Matrix Operations • Systems of Linear Equations • Vector Spaces and Subspaces • Linear Independence and Basis • Dimension and Rank • Linear Transformations • Kernel and Range of Transformations • Eigenvalues and Eigenvectors • Diagonalization of Matrices • Orthogonality and Orthogonal Projections • Inner Product Spaces • Applications of Linear Algebra in Computing and Data Analysis



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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The module will be delivered using a combination of: • Interactive lectures and mathematical discussions. • Problem-solving sessions and tutorial exercises. • Step-by-step analytical demonstrations. • Individual assignments and homework activities. • Classroom exercises involving algebraic computations. • Use of graphical and computational examples to support understanding. • Continuous assessment through quizzes, assignments, and examinations.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (2)	2 and 13	LO #1 - #7
	Assignments	1	10% (10)	11 and 14	LO # 7 and #8
	Class work	5	10% (2)		
	Home work	5	5% (1)		
	Projects / Lab.				
Summative assessment	Report	1	5% (5)		
	Midterm Exam	1 hr	10% (10)	9	LO #1 - #6
Total assessment			Final Exam	3 hr	50% (50)



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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Linear Algebra and Its Applications
Week 2	Vectors and Vector Operations
Week 3	Review of Matrices and Matrix Operations
Week 4	Systems of Linear Equations
Week 5	Vector Spaces and Subspaces
Week 6	Linear Independence and Basis
Week 7	Dimension and Rank
Week 8	Midterm Exam
Week 9	Linear Transformations
Week 10	Kernel and Range of Transformations
Week 11	Eigenvalues and Eigenvectors
Week 12	Diagonalization of Matrices
Week 13	Orthogonality and Orthogonal Projections
Week 14	Inner Product Spaces and Applications
Week 15	Applications in Computing and Data Analysis / Revision
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	



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Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	- Linear Algebra and Its Applications by Gilbert Strang - Elementary Linear Algebra by Howard Anton - Linear Algebra by Seymour Lipschutz and Marc Lipson	No
Recommended Texts	- Introduction to Linear Algebra by Gilbert Strang - Linear Algebra Done Right by Sheldon Axler - Applied Linear Algebra and Matrix Analysis by Thomas S. Shores	No
Websites	MIT OpenCourseWare – Linear Algebra Khan Academy – Linear Algebra Paul's Online Math Notes 3Blue1Brown – Essence of Linear Algebra Wolfram MathWorld – Linear Algebra	

Grading Scheme مخطط الدرجات



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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.