

	Ministry of Higher Education and Scientific Research - Iraq Al-Naji University College of Engineering AI Engineering Department	
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics		Module Delivery
Module Type	B		☒ Theory ☒ Lecture ☒ Tutorial
Module Code	NUA1101		
ECTS Credits	5.00		
SWL (hr/sem)	125		
Module Level	One	Semester of Delivery	One
Administering Department	Artificial Intelligence Engineering	College	Engineering
Module Leader	Dr. Mohammed Talal	e-mail	mohammed.talal@alnaji-uni.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor		e-mail	
Peer Reviewer Name	Ahmed F. Hussein	e-mail	ahmed.f.hussein@nahrainuniv.edu.iq
Scientific Committee Approval Date		Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The completion of this module sets the foundations which are prerequisites for understanding advanced mathematical principles and concepts that will be delivered in the next mathematics, physics, and engineering-related modules. 2. Stimulate the use of logical, systematic, mathematical and critical-thinking. 3. Improve analytical, problem-solving, and engineering-design skills through applying mathematical solutions into real-world problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	LO1. Familiarize the students with basic algebraic concepts and how to deal with basic linear, quadratic and simultaneous equations. LO2. Introduce the exponential and logarithmic functions with a clear explanation for their significance in mathematics and natural sciences. LO3. Grasp the connection between exponential and hyperbolic functions. LO4. Concisely elucidate the mathematical concepts of sequences. LO5. Comprehensively understand and be able to apply trigonometric functions for physical problems. Moreover, the fundamental periodic nature of these functions as well as the ability to analyze waves will be grasped. LO6. Defining complex numbers and justifying their necessity in mathematics to solve quadratic equations with imaginary roots. LO7. Illustrate the pictorial representation of complex numbers through Argand diagram as well as perform essential arithmetic operations for complex numbers. LO8. Convert Cartesian complex number into polar form and vice versa. Perform multiplication and division for complex numbers in polar form. Use complex numbers to solve physical problems. LO9. Understand matrix notation and how to add, subtract and multiply 2x2 and 3x3 matrices. Calculate the determinants and reciprocals of 2x2 and 3x3 matrices. LO10. Solve simultaneous equations in two and three unknowns using determinants and matrices. Determine the eigenvalues and eigenvectors of 2x2 and 3x3 matrices. LO11. Explain the difference between scalar and vector quantities, familiarize the students with essential concepts of vectors like dimensions, and understand mathematical and graphical representations of vectors. LO12. Execute arithmetic operations (addition and subtraction), differentiate between dot and cross products, demonstrate the applications of vectors in various physics and engineering subjects such as forces and electromagnetic fields.
Indicative Contents المحتويات الإرشادية	1. Algebra [7 hrs.] 2. Logarithmic & exponential functions [7 hrs.] 3. Sequences [14 hrs.] 4. Hyperbolic functions [14 hrs.] 5. Trigonometry [19 hrs.]

	6. Complex numbers [14 hrs.] 7. Matrices and determinants [14 hrs.] 8. Vectors [14 hrs.]
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The teaching approach in this course emphasizes conceptual understanding and familiarization of foundational principles for precalculus and linear algebra. Practicing problem solving should be performed with gradual increase of complexity to ensure the ideas and concepts are properly grasped. Moreover, the course focuses on merging multiple mathematical concepts as well as integrating them into applied physics and engineering scenarios whenever it is applicable to deepen the student's realization of these concepts. Assessments will be performed through various techniques such as quizzes, homework and classwork exercises, assignments, and exams. Students will be encouraged to participate interactively and collaboratively during the lectures to ensure learning outcomes are comprehended.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/N umber	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	4 , 6, 9, 11 & 13	LO 1-2, LO 3, LO 4-5, LO 6-8 and LO 9-10.
	Homework	5	10% (10)	4 , 6, 9, 11 & 13	LO 1-2, LO 3, LO 4-5, LO 6-8 and LO 9-10.
	Assignments	2	10% (10)	9 & 15	LO 1-5, LO 6-12
	Report	1	10% (10)	15	All

Summative assessment	Midterm Exam	2hr	10% (10)	7	LO 1-5
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic algebra; solving simple, simultaneous and quadratic equations.
Week 2	Logarithmic & exponential functions; inequalities.
Week 3	Polynomial division and the factor and remainder theorems
Week 4	Partial fractions
Week 5	Sequences
Week 6	Hyperbolic functions.
Week 7	Midterm Exam + Introduction to trigonometry
Week 8	Trigonometric waveforms; Cartesian and polar co-ordinates.
Week 9	Trigonometric equations, the relationship between trigonometric and hyperbolic functions, compound angles.
Week 10	Complex numbers 1
Week 11	Complex numbers 2
Week 12	The theory of matrices and determinants
Week 13	Applications of matrices and determinants
Week 14	Vectors; methods of adding alternating waveforms; scalar and vector products
Week 15	Applications of vectors
Week 16	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	
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	Bird's Comprehensive Engineering Mathematics.	Pdf version should be provided
Recommended Texts	1. Thomas' Calculus: Early Transcendentals, 15 th Edition. 2. Advanced Engineering Mathematics, 10 th Edition.	Pdf version should be provided
Websites	https://tutorial.math.lamar.edu/	

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 (فيد 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.