

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Mathematics-Level 1

Module Information				
معلومات المادة الدراسية				
Module Title	Mathematics		Module Delivery	
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	TCMM105			
ECTS Credits	8			
SWL (hr/sem)	150			
Module Level	1	Semester of Delivery		1
Administering Department	Accounting techniques	College	TCMM	
Module Leader	Ahmed Ibrahim Hussein		e-mail	Ahmed_ibrahim@ntu.edu.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	Ph.d	
Module Tutor	Ahmed Ibrahim Hussein		e-mail	Ahmed_ibrahim@ntu.edu.iq
Peer Reviewer Name	Waleed Khalid	e-mail	Waleed_khalid@ntu.edu.iq	
Scientific Committee Approval Date	16/10/2024	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

Fundamental Concepts:

1. Understand and apply basic mathematical principles including algebra, trigonometry, and calculus.
2. Develop a strong foundation in mathematical reasoning and problem-solving skills.

Analytical Skills:

1. Enhance analytical thinking through mathematical modeling and analysis.
2. Learn to formulate and solve problems using mathematical techniques.

Computational Proficiency:

3. Gain proficiency in using mathematical software and tools for computation.
4. Develop skills in numerical methods and algorithms relevant to IT applications.

Mathematics in IT:

1. Understand the role of mathematics in various IT disciplines such as computer science, data analysis, and network theory.
2. Apply mathematical concepts to solve real-world IT problems.

Discrete Mathematics:

3. Introduction to discrete mathematics, including logic, set theory, combinatorics, graph theory, and Boolean algebra.
4. Understand the significance of discrete structures in computer science and IT.

Statistics and Probability:

1. Learn the basics of statistics and probability theory.
2. Apply statistical methods to analyze data and make informed decisions in IT contexts.

Linear Algebra:

1. Understand and apply concepts of vectors, matrices, and linear transformations.
2. Use linear algebra in applications such as computer graphics, machine learning, and data processing.

: Mathematical Communication:

1. Develop the ability to communicate mathematical ideas effectively, both orally and in writing.
2. Interpret and present mathematical data clearly and concisely.

Critical Thinking:

1. Foster critical thinking and logical reasoning through mathematical proofs and problem-solving exercises.
2. Encourage independent thinking and the ability to tackle complex mathematical challenges.

:Preparation for Advanced Study:

	1.Prepare students for more advanced mathematics courses in their subsequent years of study. 2.Provide a solid mathematical foundation for specialized IT courses and professional applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Basic Mathematical Skills: 1.Demonstrate proficiency in fundamental mathematical operations, including algebra, calculus, and trigonometry. 2.Solve mathematical problems using appropriate techniques and methods. Mathematical Reasoning: 3.Apply logical reasoning and critical thinking to analyze and solve mathematical problems. 4.Construct and evaluate mathematical arguments and proofs. Analytical Skills: 1.Analyze and interpret mathematical data to draw valid conclusions. 2.Utilize mathematical modeling to represent real-world IT problems. Discrete Mathematics: 3.Understand and apply concepts of discrete mathematics, such as logic, set theory, combinatorics, graph theory, and Boolean algebra. 4.Solve problems related to discrete structures and algorithms used in computer science. Statistics and Probability: 1.Apply basic principles of statistics and probability to analyze data. 2.Use statistical methods to interpret results and make informed decisions in IT contexts. Linear Algebra: 1.Demonstrate understanding of vectors, matrices, and linear transformations. 2.Apply linear algebra techniques to solve problems in computer graphics, data analysis, and machine learning. Use of Mathematical Tools: 1.Utilize mathematical software and tools for computation and problem-solving. 2.Develop proficiency in using numerical methods and algorithms relevant to IT applications. Mathematics in IT: 1.Recognize the role of mathematics in various IT disciplines and applications. 2.Apply mathematical concepts to develop and implement solutions to IT problems. Communication of Mathematical Ideas: 4.Communicate mathematical concepts and solutions effectively, both orally and in writing. 5.Present and interpret mathematical data clearly and concisely. Independent Learning and Problem Solving: 6.Develop independent learning skills to explore mathematical concepts and problems. 7.Tackle complex mathematical challenges with confidence and creativity. Preparation for Advanced Study:

Indicative Contents المحتويات الإرشادية	1. Algebra (28 Hours) Basic Algebraic Operations (6 Hours) Polynomials, rational expressions, and algebraic fractions. Simplifying algebraic expressions. Equations and Inequalities (10 Hours) Linear equations and inequalities. Quadratic equations. Systems of linear equations. Functions (12 Hours) Definition and types of functions. Graphs of functions. Inverse functions. 2. Calculus (36 Hours) Limits and Continuity (8 Hours) Understanding limits and their properties. Continuity of functions. Differentiation (16 Hours) Basic differentiation rules. Applications of derivatives (tangents, normals, optimization problems). Integration (12 Hours) Basic integration techniques. Definite and indefinite integrals. Applications of integration (area under a curve, volume). 3. Trigonometry (20 Hours) Trigonometric Functions (8 Hours) Definitions and properties of sine, cosine, tangent. Graphs of trigonometric functions. Trigonometric Identities and Equations (6 Hours) Fundamental identities. Solving trigonometric equations. Applications of Trigonometry (6 Hours) Real-world applications (e.g., waves, oscillations). 4. Discrete Mathematics (28 Hours) Logic and Proof Techniques (8 Hours) Propositional and predicate logic. Methods of proof (direct, contradiction, induction). Set Theory (6 Hours) Sets, subsets, and set operations. Venn diagrams and applications.

	Combinatorics (8 Hours) Basic counting principles. Permutations and combinations. Graph Theory (6 Hours) Basic concepts (vertices, edges, paths, circuits). Applications in computer science. 5. Linear Algebra (24 Hours) Vectors and Matrices (10 Hours) Vector operations. Matrix operations (addition, multiplication, inversion). Determinants and Eigenvalues (8 Hours) Determinant properties and applications. Eigenvalues and eigenvectors. Applications of Linear Algebra (6 Hours) Systems of linear equations. Applications in computer graphics and data analysis. 6. Statistics and Probability (28 Hours) Descriptive Statistics (8 Hours) Measures of central tendency (mean, median, mode). Measures of dispersion (range, variance, standard deviation). Probability Theory (10 Hours) Basic probability concepts. Conditional probability and Bayes' theorem. Inferential Statistics (10 Hours) Sampling methods and distributions. Hypothesis testing and confidence intervals. 7. Numerical Methods (12 Hours) Root Finding Algorithms (4 Hours) Bisection method, Newton-Raphson method. Interpolation and Extrapolation (4 Hours) Polynomial interpolation. Numerical Integration (4 Hours) Trapezoidal and Simpson's rule. 8. Applications in IT (12 Hours) Mathematical Modeling (4 Hours) Developing mathematical models for IT problems. Algorithm Analysis (4 Hours) Understanding the mathematical basis of algorithms. Data Analysis (4 Hours) Applying statistical methods to IT-related data.
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	9. Practical Sessions (12 Hours) Software Tools (4 Hours) Using mathematical software (e.g., MATLAB, Mathematica). Problem-Solving Sessions (4 Hours) Hands-on exercises to reinforce lecture topics. Projects (4 Hours) Real-world projects integrating mathematical concepts with IT applications. Total hrs = 200 = SSWL - (Exam hrs) = 108 - 3 = 105 hr (Time table hrs x 15 weeks)
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The strategies aim to create an engaging and supportive learning environment that encourages active participation and critical thinking, ultimately helping students to develop a strong foundation in mathematics and its applications in IT.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #3, #8
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		
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Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Introduction and Basic Algebra
Week 2	Equations and Inequalities
Week 3	Functions: Definition and types of functions.
Week 4	Limits and Continuity
Week 5	Differentiation
Week 6	Differentiation - Part 2
Week 7	Integration - Part 1
Week 8	Integration - Part 2
Week 9	Trigonometric Functions
Week 10	Trigonometric Identities and Equations
Week 11	Discrete Mathematics - Logic and Proof Techniques
Week 12	Discrete Mathematics - Set Theory and Combinatorics
Week 13	Linear Algebra - Vectors and Matrices
Week 14	Linear Algebra - Determinants and Eigenvalues
Week 15	statistics and Probability
Week 16	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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Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Linear Algebra and Its Applications" by David C. Lay, Steven R. Lay, and Judi J. McDonald	Yes
Recommended Texts	Calculus: Early Transcendentals" by James Stewart	YES
Websites	www.khanacademy.org	

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.				