

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics الرياضيات		Module Delivery
Module Type	Basic		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	CS112		
ECTS Credits	6		
SWL (hr./sem)	150		
Module Level	UG I	Semester of Delivery	1
Administering Department	Department of Communications and Intelligent Digital Systems Engineering	College	Engineering
Module Leader	Asst. Prof. Dr. Mohammad T. Yaseen	e-mail	mtyaseen@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Doctor
Module Tutor	Dr. Azam Adnan Mohammed	e-mail	azam.al-kubaa@uomosul.edu.iq
Peer Reviewer Name	Asst. Prof. Dr. Saad Ahmed Ayoub	e-mail	sa_ah_ay@uomosul.edu.iq
Scientific Committee Approval Date	1/1/2026	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

<p>Module Aims أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. Student be able to solve simultaneous linear equations and inequalities involving the square root and modulus function. 2. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 3. Student be able to recognize odd, even, periodic, increasing, decreasing functions. 4. understand the operation of composition of functions and the concept of functional inverse. 5. recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 6. be able to calculate limits by substitution and by eliminating zero denominators. 7. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 8. know the basic rules of differentiation and use them to find derivatives of products and quotients. 9. know the chain rule and use it to find derivatives of composite functions.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>On completion of this course students will be expected to</p> <ol style="list-style-type: none"> 1. be able to solve algebraic equations and inequalities involving the square root and modulus function. 2. understand the difference between equations and identities, and be able to prove simple identities and inequalities. 3. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 4. be able to recognize odd, even, periodic, increasing, decreasing functions. 5. understand the operation of composition of functions and the concept of functional inverse. 6. to able to recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 7. be able to calculate limits by substitution and by eliminating zero denominators. 8. be able to calculate limits at infinity of rational functions. 9. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 10. know the basic rules of differentiation and use them to find derivatives of products and quotients. 11. know the chain rule and use it to find derivatives of composite functions.

<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <p><u>Part A – Algebraic and Complex Numbers</u></p> <p>Real Numbers and Their Properties (absolute value, inequalities); Exponents and Radicals; Polynomial and Rational Expressions (simplifying, factoring, and rationalizing); Review of Algebraic Equations (linear and quadratic); Introduction to Cartesian Coordinates. Introduction to Complex Numbers and Vectors: Definition of Complex Numbers; Real and Imaginary Parts; Algebra of Complex Numbers (addition, multiplication, conjugate, modulus); Polar Form and Euler’s Formula (optional); Introduction to Vectors in the Plane and 3D Space; Magnitude, Direction, and Operations on Vectors. [8 hrs.]</p> <p>Revision problem and tutorial classes [2 hrs.]</p> <p>Quizzes [1 hr.]</p> <p><u>Part B - Coordinates and Graphs in the Plane</u></p> <p>Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.. [14 hrs.]</p> <p>Revision problem and tutorial classes [4 hrs.]</p> <p>Quizzes [2 hr.]</p> <p><u>Part C- Derivatives</u></p> <p>Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses, Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials. [24 hrs.]</p> <p>Revision problem and tutorial classes [6 hrs.]</p> <p>Quizzes [2 hr.]</p>

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	8% (16)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	3	4% (12)	2 to 12	LO #1, 2, 4, 6 7, and 11
	Projects / Lab.	---	----	----	-----
	Report	1	7% (7)	Continuous	All
	Classwork	1	5% (5)	13	LO #1, 2, 3, 4, 5 and 7
Summative assessment	Midterm Exam	2hr	10% (10)	12	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Algebraic and Analytical Foundations: Real Numbers and Their Properties (absolute value, inequalities); Exponents and Radicals; Polynomial and Rational Expressions (simplifying, factoring, and rationalizing); Review of Algebraic Equations (linear and quadratic); Introduction to Cartesian Coordinates.
Week 2	Introduction to Complex Numbers and Vectors: Definition of Complex Numbers; Real and Imaginary Parts; Algebra of Complex Numbers (addition, multiplication, conjugate, modulus); Polar Form and Euler's Formula (optional); Introduction to Vectors in the Plane and 3D Space; Magnitude, Direction, and Operations on Vectors.
Week 3	Coordinates and Graphs in the Plane: Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing.
Week 4	Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations.
Week 5	Functions and their Graphs: Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces.
Week 6	Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas.
Week 7	A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions.
Week 8	Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.
Week 9	Derivatives: Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines The Derivative of a function, The Slope of Lines.
Week 10	Differentiation Rules: Integer Powers, Multiples, Sums, and Differences Second and Higher Order Derivatives, Negative Integer Powers of x.
Week 11	Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration
Week 12	Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions.
Week 13	The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule.
Week 14	Implicit Differentiation: Tangents, and Normal Lines Using Implicit Differentiation to Find Derivatives of Higher Order.
Week 15	Fractional Powers: Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://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.