



Ministry of Higher Education and
Scientific Research - Iraq
Al-Furat Al-Awsat Technical University
Technical College /Al-Mussaib
Department of Electrical Engineering techniques



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	DIFFERENTIAL MATHEMATICS		Module Delivery	
Module Type	BASIC		✓ Theory Lecture Lab ✓ Tutorial Practical ✓ Seminar	
Module Code	ATU23014			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	١	Semester of Delivery		1
Administering Department	DEPARTMENT OF ELECTRICAL ENGINEERING TECHNIQUES		College	Al-Furat Al-Awsat Technical University Technical College /Al-Mussaib
Module Leader	Ahmed Mahdi		e-mail	ahmed-hamza@atu.edu.iq
Module Leader's Acad. Title	Ass.prof.		Module Leader's Qualification	M.Sc.
Module Tutor	None		e-mail	None
Peer Reviewer Name	None		e-mail	None
Review Committee Approval	21/06/2023		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	To teach the students: ١- Derivatives of trigonometric functions ٢- Partial differentiation and Total differential ٣- limit and derivative concepts ٤- The Fundamental Theorem of Calculus,
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learning about the complex numbers. 2. Learning the Functions of several variables. 3. Learning the Lines and planes in space, Tangent and normal in the plane
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: ❖ <u>Complex Numbers</u> – For most students the assumptions I've made above about their exposure to complex numbers is the extent of their exposure. Problems tend to arise however because most instructors seem to assume that either students will see beyond

	<p>this exposure in some later class or have already seen beyond this in some earlier class. Students are then suddenly expected to know more than basic arithmetic of complex numbers but often haven't actually seen it anywhere and have to quickly pick it up on their own in order to survive in the class. [13 hrs]</p> <p>❖ Revision problem classes [6 hrs]</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in the delivery of this unit is to encourage students to participate in exercises, while improving and expanding their mathematical reasoning skills.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	10% (10)	4,6,8,10,11	LO #1, 2, and 4
	Assignments	12	10% (10)	Continuous	All
	Projects / Lab. Report	0	0		
		0	0		
Summative assessment	Midterm Exam	2 hr	20% (20)	8	LO # 1-6
	Final Exam	3 hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Equation of the straight line, Trigonometric functions and their sketches. Domain, Range, Inverse of functions, Absolute value, limits, Limits applications, Polar coordinates, Conic sections
Week 2	Differential calculus: Methods of differentiation, Some applications of differentiation
Week 3	Derivatives of trigonometric functions, inverse trigonometric
Week 4	Derivatives of Logarithmic and exponential functions
Week 5	Methods of differentiation, Some applications of differentiation. Rates of change, Velocity and acceleration Differentiation of parametric equations, implicit functions
Week 6	Partial differentiation, Total differential, rates of change and small changes Maxima, minima and saddle points for functions of two variables
Week 7	Hyperbolic functions, Relation between the hyperbolic functions and exponential functions

Week 8	Derivative of hyperbolic functions
Week 9,10	Differentiation II (maxima, minima and points of inflection; curve sketching; parametric, implicit and logarithmic differentiation; Maclaurin's series; Taylor's series)
Week 11,12	Theory of matrices and determinants. Properties of matrix operations, matrix transpose, matrix inverse, Applications to linear equations, Cramer's Rule. Eigen values and eigenvectors
Week 13,14	Complex Numbers & Applications: Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations. Hyperbolic Functions, Inverse Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advance Engineering Mathematics, Alan Jeffrey, ٢٠٠٢	Yes
Recommended Texts	Calculus II & Calculus III, Paul Dawkins, ٢٠٠٧	No
Websites	https://tutorial.math.lamar.edu/Classes/CalcIII/CalcIII.aspx https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx	

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (٥٠ - ١٠٠)	A – Excellent	امتياز	٩٠ - ١٠٠	Outstanding Performance
	B - Very Good	جيد جدا	٨٠ - ٨٩	Above average with some errors
	C – Good	جيد	٧٠ - ٧٩	Sound work with notable errors
	D - Satisfactory	متوسط	٦٠ - ٦٩	Fair but with major shortcomings
	E – Sufficient	مقبول	٥٠ - ٥٩	Work meets minimum criteria
Fail Group (٠ - ٤٩)	FX – Fail	مقبول بقرار	(٤٥-٤٩)	More work required but credit awarded
	F – Fail	راسب	(٠-٤٤)	Considerable amount of work required
Note:				

NB Decimal places above or below $\cdot,^{\circ}$ will be rounded to the higher or lower full mark (for example a mark of $^{\circ}\xi,^{\circ}$ will be rounded to $^{\circ}^{\circ}$, whereas a mark of $^{\circ}\xi,\xi$ will be rounded to $^{\circ}\xi$). 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.