

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Analytic Mathematics		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MATH 220		
ECTS Credits	5.00		
SWL (hr/sem)	63		
Module Level	3	Semester of Delivery	1
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	Makarim Noori	e-mail	makarim.noori@muc.edu.iq
Module Leader's Acad. Title	Assistant. Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	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	<ol style="list-style-type: none"> 1. The lecture aims to improve students' mathematical literacy and communication skills. They should be able to read and interpret mathematical notation, formulas, and graphs 2. The math lecture aims to develop students' critical thinking and problem-solving skills through mathematical exercises and applications. Students should be able to analyze engineering problems 3. Familiarize with differential equation, series and complex function: they play a crucial role in civil engineering, particularly in structural analysis and linear systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. CLO-1: Understanding and finding area of different shapes and volumes by using multiple integration method 2. CLO-2: Understanding and drawing continues function and polar function by using Chan rule and partial derivatives 3. CLO-3: Students should be able to understand and apply mathematical principles, such as series, differential equations, to solve engineering problems related to civil engineering. 4. CLO-4: Understanding and finding complex function and application of differential equations in civil engineering
Indicative Contents المحتويات الإرشادية	<p>Indicative content includes the following.</p> <p>Here are some key topics that may be covered in a series lecture:</p> <p>Sequences: A sequence is an ordered list of numbers. It forms the basis for understanding series. Series Notation: The concept of series is introduced, and the notation Σ (sigma) is used to represent the sum of a sequence of terms. Convergence and Divergence: The concept of convergence and divergence of series is discussed. Students learn how to determine whether a series</p> <p>Geometric Series: Geometric series, which have a constant ratio between successive terms, are often introduced as a specific type of series. Tests for Convergence: Various tests for determining the convergence or divergence of series are covered. Power Series: Power series, which are infinite series of the form $\Sigma(a_n(x-c)^n)$, are discussed. Taylor and Maclaurin Series: Taylor and Maclaurin series expansions are introduced. These series approximate functions using a polynomial representation. Applications of Series: The lecture may include examples and applications of series in various areas such as physics, engineering,</p> <p>Here are some key topics that may be covered in a differential equation lecture:</p> <p>Introduction to Differential Equations: The lecture may begin with an overview of what a differential equation is and its importance in modeling real-world phenomena. First-Order ODEs: The lecture may cover the basics of first-order ordinary differential equations. This includes techniques for solving separable equations, exact equations, linear equations, and equations with integrating factors Applications of</p>

	<p>first-order ODEs in growth and decay problems, population dynamics, and mixing problems may be discussed. Higher-Order Linear ODEs: The lecture may proceed to higher-order linear ordinary differential equations. Topics covered may include solving homogeneous and non-homogeneous linear equations using the characteristic equation, the method of undetermined coefficients, and variation of parameters. Applications and Modeling: Throughout the lecture, various applications of differential equations in engineering and science may be presented.</p>
--	--

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<p>Type something like: 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 types of simple experiments involving some sampling activities that are interesting to the students.</p>

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	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	2	10% (5)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (0)	0	0
	Report	1	5% (5)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All

Total assessment	100% (100 Marks)		
------------------	------------------	--	--

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction A sequence is an ordered list of numbers. It forms the basis for understanding series. Series Notation: The concept of series is introduced
Week 2	Convergence and Divergence
Week 3	Geometric Series and Power series
Week 4	Taylor and Maclaurin Series
Week 5	Applications of Series
Week 6	introduction to Differential Equations
Week 7	First-Order ODEs: separable equations, exact equations
Week 8	linear equations, and equations with integrating factors
Week 9	Higher-Order Linear ODEs: solving homogeneous equations using the characteristic equation
Week 10	Solving non-homogeneous linear using equations the method of undetermined coefficients, and variation of parameters
Week 11	Applications and Modeling of First-Order ODEs and 2 nd Order Linear ODEs.
Week 12	A review of complex numbers, including their representation, arithmetic operations, and properties.
Week 13	Complex function: discuss how complex functions can be visualized and represented geometrically using complex planes.
Week 14	Complex Differentiation: cover the Cauchy-Riemann equations, analytic functions, and the concept of a complex derivative
Week 15	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	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Thomas' Calculus, 12th Edition" by George B. Thomas Jr., Maurice D. Weir,	Yes
Recommended Texts	Engineering Mathematics" by K.A. Stroud and Dexter J. Booth:	No
Websites		

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.				