MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	APPLIED MATHEMATICS I	Module Delivery
Module Type	BASIC	
Module Code	E201	**Theory** **Lecture** **Tutorial**
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level	I 1	Semester (s) offered	1
Administering Department		**College**	Engineering
Module Leader	Mounir Thamer Ismaiel	**e-mail**	moneerthameerenge@uodiyala.edu.iq
Module Leader's Acad. Title	Assist. Lect.	**Module Leader's Qualification**	MSC in Electrical Power
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATHEMATICS II	**Semester**	2
Co-requisites module	None	**Semester**	-

	Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر	
Module Aims أهداف المادة الدراسية	This module aims After completing Math I in first year the student will study Math II which is more elaborate in calculus subjects including differential equations of first and second order, partial differential equation, studying series including Maclaurin and Taylor series, and studying also Laplace transformations and their use in solving differential equations.	
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.The module learning outcomes of Applied Mathematics I typically encompass a range of mathematical concepts and skills relevant to various fields such as engineering, physics, economics, and other quantitative disciplines. Here are some common learning outcomes for Applied Mathematics I: 2.Understanding Mathematical Concepts: Students should develop a solid understanding of fundamental mathematical concepts such as algebra, calculus, trigonometry, and geometry. 3.Problem-Solving Skills: Students should be able to apply mathematical techniques to solve problems encountered in real-world situations. This includes interpreting problems, selecting appropriate mathematical methods, and analyzing solutions. 4. Computational Proficiency: Students should gain proficiency in using mathematical software tools or programming languages to perform calculations, analyze data, and visualize mathematical concepts. 5. Analytical Thinking: The module should foster analytical thinking skills, enabling students to break down complex problems into simpler components and apply mathematical reasoning to develop solutions. 6.Numerical Methods: Students should learn numerical methods for approximating solutions to mathematical problems, including root-finding, interpolation, and numerical integration. 1. Graphical Representation: Students should be able to represent mathematical functions graphically and interpret the graphical representations to gain insights into the behavior of functions and relationships between variables. 2. Understanding Mathematical Models: Students should understand how mathematical models are used to describe and analyze real-world phenomena, including physical systems, economic processes, and population dynamics.	
Indicative Contents المحتويات الإرشادية	The topics listed under the indicative content below are the underpinning areas of knowledge and understanding that will be obtained from successful	

	completion of the module. The mathematical topics are illustrated in the context of relevant engineering scenarios.
	First Order: Variable Separable and **Homogenous** Differential equations **Linear, Bernoulli**, and Exact Differential Equations **Applications of first order** differential equations in electrical circuits **Second Order**: Homogeneous and non Homogeneous Differential Equations - Variation of parameters, undetermined coefficients - Higher Order Differential equations **Partial Differentiation:** Function of Two or More Variables and the Chain Rule - Directional Derivatives and Gradient Vectors - Tangent planes and normal Lines **Maximum, Minimum**, and Saddle Points **Laplace Transform**: Definition, Properties, Gamma and Unit Step Functions - Laplace Transform methods **Inverse Laplace Transform:** Properties and Partial Fractions - Solution of Differential Equations Using Laplace Transform **Applications:** Solution of Electric Circuits Using Laplace Transform
Course Description	This course lays the foundation for a robust understanding of mathematical concepts that underpin the various disciplines within engineering. It covers an introductory course designed to provide students with a foundational understanding of fundamental mathematical concepts and their applications in various fields. The course emphasizes the development of problem-solving skills and mathematical reasoning through practical examples and exercises.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم
Strategies	solve different mathematical problems and gain the ability to analyze them and aim to facilitate students' understanding of mathematical concepts, develop problem-solving skills, and promote active engagement with the material. By employing these learning and teaching strategies, instructors can create an engaging and effective learning environment that promotes understanding, critical thinking, and application of mathematical concepts in Applied Mathematics I.

Student Workload (SWL)			
الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 53 **In class tests** 10 **Tutorial** 15	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Assignment** 20 **Preparation for tests** 20 **Homework** 32	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation					
تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	2	10% (10)	3,5, 10, 12, 14	LO #1, 2, 3, 4 ,5,

					7and 8
assessment	Assignments	6	20% (20)	4, 8, 12	LO #2,4, 6, and 8
Summative assessment	Midterm Exam	2	20% (20)	7	LO # 1,2,3,4,5,6,7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First Order: Variable Separable and Homogenous Differential equations
Week 2	Linear, Bernoulli, and Exact Differential Equations
Week 3	Applications of first order differential equations in electrical circuits
Week 4	Second Order: Homogeneous and non Homogeneous Differential Equations
Week 5	Variation of parameters, undetermined coefficients
Week 6	Higher Order Differential equations
Week 7	Partial Differentiation: Function of Two or More Variables and the Chain Rule
Week 8	Directional Derivatives and Gradient Vectors
Week 9	Tangent planes and normal Lines
Week 10	Maximum, Minimum, and Saddle Points
Week 11	Laplace Transform: Definition, Properties, Gamma and Unit Step Functions
Week 12	Laplace Transform methods
Week 13	Inverse Laplace Transform: Properties and Partial Fractions
Week 14	Solution of Differential Equations Using Laplace Transform

Week 15	Applications: Solution of Electric Circuits Using Laplace Transform
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	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas. Calculus, Early Transcendentals by Stewart.	Yes
Recommended Texts	Advanced Engineering Mathematics, Erwin Kryszig.	Yes
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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.