

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Ordinary Differential Equations		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	MATH-214		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	
Administering Department	MATH	College	UNI
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH-102	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives أهداف المادة الدراسية</p>	<ol style="list-style-type: none">1- To introduce students to the fundamentals of ordinary differential equations (ODEs).2- To familiarize students with different types of ODEs, their classifications, and standard forms.3- To provide students with various methods for solving ODEs, including first-order ODEs and higher-order ODEs with constant and variable coefficients.4- To enable students to apply ODEs to real-world problems and interpret the solutions in the context of the problems.5- To develop students' analytical and problem-solving skills through the study of ODEs.6- To enhance students' understanding of mathematical modeling and its applications in various fields.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<p>By the end of this module, students should be able to:</p> <ol style="list-style-type: none">1- Define and explain the concepts of ordinary differential equations, order, degree, linearity, nonlinearity, and classifications of ODEs.2- Solve first-order ODEs using different methods, such as separation of variables, exact equations, homogeneous equations, and integrating factors.3- Solve higher-order ODEs with constant coefficients using characteristic roots and the method of undetermined coefficients.4- Solve non-homogeneous ODEs using the method of undetermined coefficients and the method of variation of parameters.5- Solve ODEs with variable coefficients using appropriate techniques.6- Apply Laplace transforms to solve ODEs and understand their properties.7- Convert higher-order ODEs into systems of first-order ODEs.8- Analyze and interpret the solutions of ODEs in the context of real-world problems.9- Apply ODEs to mathematical modeling in various fields.
<p>Indicative Contents المحتويات الإرشادية</p>	<ol style="list-style-type: none">1- Introduction to ordinary differential equations: definitions, order, degree, linearity, nonlinearity, classifications.2- First-order ODEs: standard forms, methods of solution (separation of variables, exact equations, homogeneous equations, integrating factors).3- Higher-order ODEs with constant coefficients: characteristic roots method, method of undetermined coefficients.4- Non-homogeneous ODEs: undetermined coefficients method, variation of parameters.5- ODEs with variable coefficients: methods of solutions.6- Euler equations: definitions, methods of solution.7- Power series solutions for ordinary singular points.8- Laplace transforms and their properties.9- Inverse Laplace transforms.10- Laplace method for solving ODEs with constant coefficients.11- Systems of ODEs: transformation of higher-order ODEs into systems of first-order ODEs.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1- Lectures: Theoretical explanations and derivations of concepts and techniques. 2- Problem-solving sessions: Solving ODEs step by step to illustrate the application of different methods. 3- Tutorials: Providing additional practice problems and discussing solutions. 4- Computer simulations and software tools: Using mathematical software to solve ODEs numerically and visualize solutions. 5- Real-world examples and case studies: Applying ODEs to model and solve problems from various fields. 6- Group discussions and presentations: Encouraging active participation and collaborative learning. 7- Self-study: Reviewing lecture notes, reading recommended textbooks and resources, and practicing additional problems.
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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	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	4	30% (30)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	5% (5)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	5% (5)	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)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to ODEs, order, degree, linearity, and classifications
Week 2-5	First-order ODEs and their solutions
Week 5-6	Higher-order ODEs with constant coefficients
Week 7-8	Non-homogeneous ODEs and methods of solution
Week 9	ODEs with variable coefficients and methods of solution
Week 10-12	Euler equations and power series solutions
Week 12-14	Laplace transforms and their applications
Week 15	Systems of ODEs and their transformation
Week 16	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	حلول المعادلات التفاضلية الاعتيادية / د. عادل غسان نعيم و اخرين	YES
Recommended Texts		
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.