

	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al-Anbiyaa College of Advanced Technologies Department of Refrigeration and Air Conditioning Techniques Engineering	
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	<u>Engineering and Numerical Analysis</u>		Module Delivery
Module Type	<u>S</u>		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	<u>HVAC300</u>		
ECTS Credits	<u>4</u>		
SWL (hr/sem)	<u>100</u>		
Module Level	<u>3</u>	Semester of Delivery	<u>1</u>
Administering Department	<u>M.SC-HVAC</u>	College	<u>Advanced Technologies</u>
Module Leader	<u>Minyar Hamdi</u>	e-mail	
Module Leader's Acad. Title	<u>Asst.Lecturer</u>	Module Leader's Qualification	<u>M.s.C</u>
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	<u>31/08/2026</u>	Version Number	<u>1.0</u>

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	HVAC300	Semester	L2- S1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This course aims to provide a good knowledge to the students about the Engineering and numerical analysis with understand the basis of solutions and their application in different branches of engineering / mechanical, material, Civil and power.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the methods of solutions for first, second and high orders differential equations and their engineering applications. 2. Understand the types and method of solution for Fourier Series and their engineering applications. 3. Understand the methods of solution by Laplace transformation and their applications. 4. Understand the methods of solution for partial differential equation and their engineering application. 5. Understand the numerical methods for solving linear and non-linear equations and their engineering applications. 6. Understand the numerical methods for solving the differential

	equations and their engineering applications.
Indicative Contents المحتويات الإرشادية	<u>Indicative content includes the following.</u> Give the students information about : Differential Equations. First, 2nd and, Higher Linear Order Differential Equations, [12hrs] Fourier series, [10hrs] Laplace and Laplace Inverse transformation, [12hrs] Euler equation, [10hrs] Runge-Kutta method, [10hrs] interpolation, [10hrs] iteration, [10hrs] partial Differential Equations[13hrs] TOTAL Structured SWL (h/sem)=87
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.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	87	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	6.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	13	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	15% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	0	0% (10)	0	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

كلية التقنيات الحديثة

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

Week	Subject
1	First order differential equations, Special cases of first order D.E and their engineering applications.
2	Second order linear equation with constant coefficients and their engineering applications.

3	High order linear differential equations , Integral operators and their engineering applications.
4	Fourier series, even and odd functions and their engineering applications.
5	Gamma Function and integral solution.
6	Laplace transformation, Inverse Laplace transformation, Laplace transformation to solution for differential equations and their engineering applications.
7	Partial differential equations, solution by separation method and their engineering applications.
8	Nonlinear equations solution, Simple Iteration, Newton-Raphson, finite difference methods.
9	Solution of simultaneous linear equations, Direct and Indirect methods
10	Interpolation by Lagrangian and Newton methods.
11	Curves fitting analysis by Newton method.
12	Numerical integration, complex numerical integration and their applications.
13	Numerical method to solve partial differential equations by separation method.
14	Numerical method to solve differential equations by Rang-Kotta and Power series.
15	Numerical method to solve differential equations by exponential equations. method
Week 16	Preparatory week before the final Exam

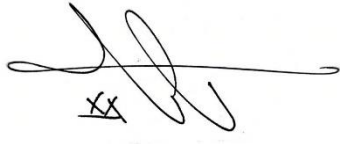
Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	1- Advanced Engineering Mathematics, Erwin Kreyszig , John Wiley & Sons, Inc. 2- Advanced Engineering Mathematics, Peter V. O'Neil, Thomson Brooks/Cole 3- Advanced Engineering Mathematics, A.B. Mathur & V.P. Jaggi, Khanna Publishers 4- Advanced Engineering Mathematics, Wyle Barrett /fifth edition.	no

	5- Numerical Methods for Scientists and Engineers, R.w. Hamming knowledge. 6- Numerical Analysis, Richard L. Burden & J. Douglas Faires. 7- Introduction to Numerical Analysis, F.B. Hildebrand.	
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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.				



استاذ المادة: م.م. منيار حمدي



العميد: ا.م.د علي باسم محمد



رئيس القسم: ا.م.د محمد حسن عبود

التاريخ: 31-8-2026

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