Ministry of Higher Education and
Scientific Research - Iraq

University of Warith Al_Anbiyaa....
College of Engineering
Oil and Gas Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information		
معلومات المادة الدراسية		

Module Title	**Partial Differential Equations**		**Module Delivery**
Module Type	**Basic**		☒ Theory
Module Code	**ENG226**		☐ Lecture
ECTS Credits	**5**		☐ Lab
SWL (hr/sem)	**125**		☒ Tutorial
			☐ Practical
			☐ Seminar

Module Level	UGII	**Semester of Delivery**		4
Administering Department	OGE	**College**	ENG	
Module Leader	Dr.dheiaa hamadi	**e-mail**	E-mail: Dheiaa.ha@uowa.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**		Ph.D
Module Tutor		**e-mail**	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	ENG212	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Important objectives of the calculus sequence are to develop and strengthen students' problem-solving skills and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply calculus tools to a variety of problem situations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Find limits of functions (graphically, numerically, and algebraically) 2. Analyze and apply the notions of continuity and differentiability to algebraic and transcendental functions. 3. Determine derivatives by a variety of techniques including explicit differentiation, implicit differentiation, and logarithmic differentiation. Use these derivatives to study the characteristics of curves. Determine derivatives using implicit differentiation and use them to study the characteristics of a curve. 4. Students will use a variety of methods to solve the Laplace and Poisson equations.

	5. Harmonic function characteristics will be examined by the students. 6. The heat and wave equations will be solved, and students will examine their characteristics. 7. The characteristic approach will be used by students to resolve first order partial differential equations. 8. Students will evaluate conservation laws' characteristics. 9. Students will examine some other nonlinear PDEs' properties if time allows.
Indicative Contents المحتويات الإرشادية	1. To model and comprehend scenarios involving exponential growth or decay and second order physical systems, use established DE types. 2. Use a variety of input functions, such as zero, constants, exponentials, sinusoids, step functions, impulses, and superpositions of these functions, to solve the major equations. 3. Use the characteristic equation, exponential response formula, Laplace transform, convolution integrals, Fourier series, complex arithmetic, parameter variation, elimination, and anti-elimination methods to solve the differential equations mentioned above. 4. Be able to solve linear DEs using the fundamental ideas of linearity, superposition, and the existence and uniqueness of DE solutions.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Highlight conceptual comprehension. • Assign homework that is difficult and builds on the lessons you gained in class. • Cooperative learning strategies ought to be applied.

	• Submit intelligent queries.
	• Put your focus on logical reasoning and practical problem-solving.
	• Use a range of assessment techniques.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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% (10)	5, 10	LO #3 and 10
	Assignments in collage	10	10% (10)	Continuous	All
	Assignments in home	10	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

<table>
<tr><td colspan="2" align="center">Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري</td></tr>
<tr><td></td><td>Material Covered</td></tr>
<tr><td>Week 1</td><td>-   General Review</td></tr>
<tr><td>Week 2</td><td>-   Special Functions I</td></tr>
<tr><td>Week 3</td><td>-   Special Functions I</td></tr>
<tr><td>Week 4</td><td>-   Fourier Analysis and Series</td></tr>
<tr><td>Week 5</td><td>-   Fourier Transform I</td></tr>
<tr><td>Week 6</td><td>-   Inverse of Fourier Transform</td></tr>
<tr><td>Week 7</td><td>-   Laplace Transform</td></tr>
<tr><td>Week 8</td><td>-   Inverse of Laplace Transform</td></tr>
<tr><td>Week 9</td><td>-   Methods of Solving PDE: (Direct integration method, Variables separable, Fourier Transform, Laplace Transform, ODE methods)</td></tr>
<tr><td>Week 10</td><td>-   One Dimension Heat Equation, Two Dimension Heat Equation (Laplace equation) by Variable separable</td></tr>
<tr><td>Week 11</td><td>-   One Dimension Heat Equation, Two Dimension Heat Equation (Laplace equation) by Transforms</td></tr>
<tr><td>Week 12</td><td>-   One Dimension Wave Equation by Variable separable, Wave Equation: D. Alembert's formula</td></tr>
<tr><td>Week 13</td><td>-   One Dimension Wave Equation by transforms</td></tr>
<tr><td>Week 14</td><td>-   Single Phase Fluid Flow Equation Solution</td></tr>
<tr><td>Week 15</td><td>-   Final Exam</td></tr>
<tr><td>Week 16</td><td>-   The preparatory week before the Final Exam</td></tr>
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	Learning and Teaching Resources مصادر التعلم والتدريس	
	Text	**Available in the Library?**
Required Texts	1- George B. Thomas, "THOMAS' CALCULUS ", Eleventh Edition 2011, Dorling Kindersley (India). 2- Spiegel, M. R. Schaums outline series, theory and problems of Lablace transform, copy write 1965 by Mc Graw-Hill Inc. 3- Spiegel, M. R. Schaums outline series, theory and problems of Fourier analysis with application to boundary value problem, copy write 1974 by Mc Graw-Hill Inc.	
Recommended Texts	1- Ford , S.R. and Ford , J.R. " Calculus " , (1963) McGraw-Hill. 2- K.Back house and S.P.T. Houldsworth " Pure Mathematics a First Course " (1979) , S1 Edition , Longman Group . 3- Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons. Inc., 9th ed., 2006.	
Websites	1- https://en.wikipedia.org/wiki/Differential_equation 2- https://byjus.com/maths/differential-equation/	

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.