MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Numerical Methods**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**UOMU0206066**				
ECTS Credits	**3**				
SWL (hr/sem)	**90**				
Module Level	UGIII		**Semester of Delivery**		Six
Administering Department	**Fuel and Energy Techniques Engineering Department**		**College**	**Technical Engineering College**	
Module Leader	**Mohammed Maytham Obaid**		**e-mail**	mohammed.maytham.obeid@uomus.edu.iq	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**		**PhD in Mechanical Engineering**
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**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 Aims	1- To define the Numerical analysis used for solving non-linear equations of unknown roots. 2- To define the Solution methods used for solving the Linear System of Equations. 3- To define the interpolation process and the interpolation methods used to compute the unknown value of the function of giving values and its applications. 4- To define the curves fitting analysis. 5- To define the numerical integration and their applications. 6- To define the numerical solution methods used for solving the partial differential Equations. 7- To define the numerical solution methods used for solving the ordinary differential Equations.
Module Learning Outcomes	Upon completion of the course, students should be able to: 1. Understand the numerical methods used for solving non-linear equations of unknown roots by applying Iteration Techniques. 2. Understand the direct and indirect Solution methods used for solving the Linear System of Equations and their applications. 3. Understand the interpolation methods used to compute the unknown value of the function of giving values and its applications. 4. Understand the curves fitting analysis by using Newton method. 5. Understand the numerical methods used for integration and their applications. 6. Understand the numerical methods used to solve the partial differential equations. 7. Understand the numerical methods used to solve the ordinary differential equations.
Indicative Contents	Indicative content includes the following. 1. Introduction of numerical solution, iteration methods of solutions, the Solution of Systems of Non-Linear Equations, and the engineering applications. [12 hrs] 2. Introduction of Linear systems of equations, direct methods, indirect methods, engineering applications) [12 hrs]

	3. Introduction of Interpolation process, Newton's Divided-Difference Interpolation Polynomials, Equal Spacing, Lagrange Interpolating Polynomials. [12 hrs] 4. Introduction of Curves fitting analysis, Newton method. [6 hrs] 5. Introduction of the Numerical integration, complex numerical integration, applications. [12 hrs] 6. Introduction of Numerical method to solve differential equations, Rang-Kotta method, Power series, exponential equations method. [18 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem)	45	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	45	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	90		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,6,10	LO #1,2,…..10
	Assignments	2	10% (10)	7, 8	LO # 8
	Seminar	1	10% (10)	11	LO # 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	12	LO # 1-12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد	
	Material Covered
Week 1	Nonlinear equations solution, Simple Iteration.
Week 2	Newton-Raphson, finite difference methods.
Week 3	Solution of simultaneous linear equations, Direct methods
Week 4	Solution of simultaneous linear equations Indirect methods
Week 5	Interpolation by Lagrangian method.
Week 6	Interpolation by Newton method.
Week 7	Curves fitting analysis by Newton method
Week 8	Numerical integration, complex numerical integration.
Week 9	Numerical integration applications.
Week 10	Numerical method to solve partial differential equations
Week 11	Numerical method solution by separation method.
Week 12	Numerical method to solve differential equations by Rang-Kotta method
Week 13	Numerical method to solve differential equations by Power series.
Week 14	Numerical method to solve differential equations by exponential equations method
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Recommended Texts	1. Numerical Methods for Scientists and Engineers, R.w. Hamming knowledge. 2. Numerical Analysis, Richard L. Burden & J. Douglas Faires. 3. Introduction to Numerical Analysis, F.B. Hildebrand.	No

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.