



Ministry of Higher Education and
Scientific Research - Iraq
Al-Mansour University College
Department of Communication Engineering



الملحق 4: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Analyses		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	COM 35105		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	UGIII	Semester of Delivery	
Administering Department	BSc - COMM	College	Al-Mansour University College
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	13-9-2025	Version Number	1.0

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



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Familiarity with mathematical relationships and converting them to matrices. 2. Familiarity with basic concepts, as well as continuous and discrete mathematical relationships. 3. Familiarity with relationships specific to numerical matrices and how to calculate them. 4. Familiarity with complex variables and methods of calculating differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate the knowledge and understanding of the fundamental concepts, principles and theories of matrices 2. Understand process of electrical circuit and use integrated and solve complex problems by using matrices 3. Demonstrate achievement of a subject numerical analysis. 4. Solving special functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Course introduction (2 hrs) • Working with tutorial (23 hrs) • Theoretical lectures (60 hrs) • Examinations (5 hrs)
Description	Matrix analysis, Singular and non-singular matrices, Rank of a matrix, Elementary operations and equivalent matrices, Consistency of a set of equations, Uniqueness of solutions of sets of equations, Inverse method, Row transformation method, Gaussian elimination method, triangular decomposition method, Comparison of methods. Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalization of a matrix, Systems of second-order differential equations, Matrix transformation, Rotation of axes, application of matrices to electric circuit. Interpolation: Polynomials, Curve Fitting, and Interpolation, Modeling, Computers, and Error Analysis. Roots of Equations: Bracketing Methods: Graphical Methods, The Bisection Method, The False-Position Method, Incremental Searches and Determining Initial Guesses; Open Methods: Simple Fixed-Point Iteration, The Newton-Raphson Method, The Secant Method, Multiple Roots, Systems of Nonlinear Equations. Roots of Polynomials: polynomials in Engineering and Science, Conventional Methods, Müller's Method, Bairstow's Method. Naïve Gauss Elimination, Pitfalls of Elimination Methods, Nonlinear Systems of Equations, Gauss-Jordan; LU Decomposition and Matrix Inversion: LU Decomposition, Solution of Differential Equation by Power Series: Legendre's equation, Legendre's polynomials, Bessel function of the first kind and its solution

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	In this course, students are guided by:
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- Using different examples.
- Using different styles of discussion that aim to connect the theoretical and practical sides.
- Asking questions and giving exercises that require analysis and conclusions related to lectures.
- Encourage students to participate in discussions and do the practical work.
- Encourage students to work in groups.

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	6 and 12	LO #1 to #3 and #4 to #6
	Assignments	2	10% (5)	2 and 13	LO #3 to #6
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3, #4 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		



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Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Matrix analysis, Singular and non-singular matrices with (2 hrs) tutorial
Week 2	Rank of a matrix, Elementary operations and equivalent matrices, Consistency of a set of equations, Uniqueness of solutions of sets of equations (2 hrs) tutorial
Week 3	Inverse method, Row transformation method, Gaussian elimination method (2 hrs) tutorial
Week 4	Triangular decomposition method, Comparison of methods. (2 hrs) tutorial
Week 5	Eigenvalues and eigenvectors, Cayley-Hamilton theorem, (2 hrs) tutorial
Week 6	Diagonalization of a matrix, Systems of second-order differential equations, Matrix transformation, Rotation of axes, application of matrices to electric cct. (2 hrs) tutorial
Week 7	Interpolation: Polynomials, Curve Fitting, and Interpolation (2 hrs) tutorial
Week 8	Modeling, Computers, and Error Analysis. Roots of Equations: Bracketing Methods: Graphical Methods, The Bisection Method, (2 hrs) tutorial
Week 9	The False-Position Method, Incremental Searches and Determining Initial Guesses; Open Methods: Simple Fixed-Point Iteration (2 hrs) tutorial
Week 10	The Newton-Raphson Method, The Secant Method, Multiple Roots, Systems of Nonlinear Equations. Roots of Polynomials: polynomials in Engineering and Science, (2 hrs) tutorial
Week 11	Conventional Methods, Müller's Method, Bairstow's Method. :, (2 hrs) tutorial
Week 12	Naïve Gauss Elimination, Pitfalls of Elimination Methods, Nonlinear Systems of Equations, Gauss-Jordan; LU Decomposition and Matrix Inversion: LU Decomposition, (2 hrs) tutorial
Week 13	Solution of Differential Equation by Power Series: Legendre's equation (2 hrs) tutorial
Week 14	Legendre's polynomials (2 hrs) tutorial
Week 15	Bessel function of the first kind and its solution. (2 hrs) tutorial



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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, 3rd edition, by C. R. Wylie	Yes
Recommended Texts	- Mathematics for Engineers and Applied Scientists, 2nd edition, by Stanley. - Introductory Digital Signal Processing, 2nd edition by P. A. Lynn.	No
Websites	Microsoft Help, https://support.microsoft.com/en-us/products Learn Microsoft Office, https://www.goskills.com/Microsoft-Office	

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.