



Ministry of Higher Education and  
Scientific Research - Iraq  
University of Diyala  
College of Engineering  
Department of Materials Engineering



## MODULE DESCRIPTOR

### وصف المادة الدراسية

<b>Module Information</b> معلومات المادة الدراسية			
<b>Module Title</b>	<b>ENGINEERING ANALYSIS</b>		<b>Module Delivery</b>
<b>Module Type</b>	<b>BASIC</b>		<b>Theory Lecture Tutorial</b>
<b>Module Code</b>	<b>MAE327</b>		
<b>ECTS Credits</b>	<b>3</b>		
<b>SWL (hr/sem)</b>	<b>45</b>		
<b>Module Level</b>	<b>1</b>	<b>Semester (s) offered</b>	
<b>Administering Department</b>		<b>College</b>	Engineering
<b>Module Leader</b>		<b>e-mail</b>	
<b>Module Leader's Acad. Title</b>		<b>Module Leader's Qualification</b>	
<b>Module Tutor</b>		<b>e-mail</b>	
<b>Peer Reviewer Name</b>		<b>e-mail</b>	
<b>Review Committee Approval</b>		<b>Version Number</b>	1.0

<b>Relation With Other Modules</b> العلاقة مع المواد الدراسية الأخرى			
<b>Prerequisite module</b>	None	<b>Semester</b>	-
<b>Co-requisites module</b>	None	<b>Semester</b>	-
<b>Module Aims, Learning Outcomes, Indicative Contents and Brief Description</b> أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
<b>Module Aims</b> أهداف المادة الدراسية	This module aims to provide students with an understanding of, and competence in the use of, engineering analysis methods that are relevant to the solution of engineering problems. It will also give students a firm foundation from which to develop solutions to a wider and deeper range of engineering problems that they will encounter throughout their undergraduate engineering program of study.		
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> <li>1. Demonstrate familiarity with aspects of applied calculus.</li> <li>2. Demonstrate fluency in the use of mathematical tools in problem solving.</li> <li>3. Demonstrate knowledge of the appropriate mathematical tools necessary for the further study of electronic, mechanical and computer systems.</li> <li>4. Demonstrate fluency in the use of these tools in problem solving.</li> <li>5. Demonstrate IT skills</li> </ol>		
<b>Indicative Contents</b> المحتويات الإرشادية	<p>The topics listed under the indicative content below are the underpinning areas of knowledge and understanding that will be obtained from successful completion of the module. The mathematical topics are illustrated in the context of relevant engineering scenarios.</p> <p>Complex number and variable operations, derivative and analytic functions, Cauchy reman equation, geometry of analytic function. <b>Complex integration:</b> Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, derivatives of analytic functions. <b>Fourier series:</b> Periodic functions, Fourier series, even and odd functions, half range expansion, complex Fourier series, Fourier integral, Fourier cosine and sine transforms, Fourier transform. <b>Partial Differential Equations:</b> Basic concept, modeling vibrating string, wave equation, heat equation, separation of variables, D'Alembert solution of the wave equation, modeling of membrane 2D wave equation, rectangular membrane, Laplacian in polar coordinate, solution by Laplace transform.</p>		
<b>Course Description</b>	This course description provides a summary of the most important characteristics of the course and the learning outcomes that the student is expected to achieve, demonstrating whether he or she has made the most of the learning opportunities available. It must be linked to the program description.		

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p>Begin In Engineering analysis, then employ a range of teaching strategies to ensure third-year engineering students fully grasp the various mathematical concepts. Instructional methods include interactive lectures, where core mathematical principles are explained in detail, and practical problem-solving sessions to provide hands-on learning experiences. Collaborative group work encourages peer-to-peer learning and reinforces understanding through shared insights. Regular formative assessments will be conducted to monitor students' understanding of the material, and feedback will be promptly given to guide their learning process. Instructors will maintain office hours for personalized support, and online resources will be available to supplement classroom instruction. Emphasis will be placed on relating mathematical concepts to real-world engineering applications to make the learning experience more relevant and engaging. These strategies aim to develop students' critical thinking skills, enhance their problem-solving abilities, and prepare them for advanced engineering studies.</p>
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## Module Evaluation

### تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	3,5, 10, 12, 14	LO #1, 2, 3, 4,5 and 7
	<b>Assignments</b>	6	20% (20)	4, 8, 12	LO # 1, 2, 3, 4, 5 and 6
<b>Summative assessment</b>	<b>Midterm Exam</b>	2	20% (20)	7	LO # 1,4
	<b>Final Exam</b>	3	50% (50)	15	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	Principle and theory mathematic MATRICES
<b>Week 2</b>	Principle properties of eigenvalue and eigenvector
<b>Week 3</b>	Classification of FOURIER SERIES
<b>Week 4</b>	Classification of FOURIER SERIES

<b>Week 5</b>	LAPLACE TRANSFORM
<b>Week 6</b>	LAPLACE TRANSFORM
<b>Week 7</b>	Invers LAPLACE TRANSFORM
<b>Week 8</b>	Partial Differential Equations: Basic concept
<b>Week 9</b>	Modeling vibrating string, wave equation, heat equation, separation of variables
<b>Week 10</b>	Modeling vibrating string, wave equation, heat equation, separation of variables
<b>Week 11</b>	D'Alembert solution of the wave equation
<b>Week 12</b>	Modeling of membrane 2D wave equation, rectangular membrane
<b>Week 13</b>	Modeling of membrane 2D wave equation, rectangular membrane
<b>Week 14</b>	Laplacian in polar coordinate, solution by Laplace transform.
<b>Week 15</b>	Exam

<b>Delivery Plan (Weekly Lab. Syllabus)</b> المنهاج الاسبوعي للمختبر	
	<b>Material Covered</b>
<b>Week 1</b>	
<b>Week 2</b>	
<b>Week 3</b>	
<b>Week 4</b>	
<b>Week 5</b>	
<b>Week 6</b>	
<b>Week 7</b>	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
<b>Required Texts</b>	A_Textbook_of_Engineering_Mathematics_(Volume_I) Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, (2010).	Yes
<b>Recommended Texts</b>	Zill, Dennis G. Advanced engineering mathematics. Jones & Bartlett Learning, 2020.	Yes
<b>Websites</b>		

#### APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
<b>Success Group (50 - 100)</b>	<b>A</b> - Excellent	امتياز	90 - 100	Outstanding Performance
	<b>B</b> - Very Good	جيد جدا	80 - 89	Above average with some errors
	<b>C</b> - Good	جيد	70 - 79	Sound work with notable errors
	<b>D</b> - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	<b>E</b> - Sufficient	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX</b> – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required
<b>Note:</b>				
<p>NB 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.</p>				