

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Analysis		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	COGTEK 300		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3	Semester of Delivery	
Administering Department	RETE	College	Oil and gas technical college/ Kirkuk
Module Leader		e-mail	
Module Leader's Acad. Title	Assist. Lecture	Module Leader's Qualification	MSc
Module Tutor	Ali Qani Mohammed Saleh	e-mail	ali.alkurdi23@ntu.edu.iq
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	01/06/2023	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

<b>Module Objectives</b> أهداف المادة الدراسية	<ol style="list-style-type: none"><li>1. Develop a solid foundation in mathematical concepts and techniques used in engineering analysis.</li><li>2. Understand the principles and applications of numerical methods for solving engineering problems.</li><li>3. Gain proficiency in using software tools and programming languages for numerical analysis.</li><li>4. Acquire the skills to analyze and interpret numerical results to make informed engineering decisions.</li><li>5. Apply mathematical modeling techniques to solve real-world engineering problems.</li></ol>
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	<p>The intended subject specific learning outcomes. On successfully completing the module students will be able to:</p> <ol style="list-style-type: none"><li>1- Acquire a comprehensive understanding of the fundamental principles and concepts underlying a broad range of basic methods used in engineering analysis.</li><li>2- Demonstrate proficiency in applying a variety of established techniques and effectively utilizing computational tools to solve engineering problems.</li><li>3- Apply the acquired knowledge and skills in basic numerical approximation to address complex problems in diverse contexts, demonstrating the ability to critically assess and select appropriate tools and techniques.</li><li>4- Effectively employ MATLAB commands and functions to implement and execute engineering analysis tasks, demonstrating competence in utilizing computational tools for problem-solving.</li></ol>
<b>Indicative Contents</b> المحتويات الإرشادية	<p>Part A</p> <ol style="list-style-type: none"><li>1- Introduction, Mathematical Analysis, Function Analysis and Complex Function Analysis [ 20 hr.]</li><li>2- Mathematical Modeling, Logistic Regression Analysis, Probability and Statistics Analysis and Advanced Probability and Statistics Analysis [ 20 hr.]</li><li>3- Revision problem classes and quiz [3 hrs]</li></ol> <p>Part B</p> <ol style="list-style-type: none"><li>4- Linear and Nonlinear Regression Analysis, Optimization Analysis and Optimal Control and Nonlinear Optimization Analysis [ 20 hr.]</li></ol>

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

<b>Strategies</b>	<ol style="list-style-type: none"> <li>1. Establish a solid foundation: Start by thoroughly understanding the fundamental concepts and principles of engineering analysis. This includes grasping the mathematical techniques and numerical methods commonly used in the field.</li> <li>2. Practice problem-solving: Engineering analysis involves solving complex problems. Regularly practice solving a variety of problems to enhance your problem-solving skills and develop a deeper understanding of the subject matter.</li> <li>3. Utilize resources: Take advantage of textbooks, online resources, and reference materials specific to engineering analysis. These resources can provide additional explanations, examples, and practice problems to reinforce your understanding.</li> </ol>
-------------------	--

## Student Workload (SWL)

### الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطلاب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطلاب أسبوعيا	4.2
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطلاب خلال الفصل	87	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5.8
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطلاب خلال الفصل	<b>150</b>		

## Module Evaluation

### تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10% (10)	5 and 10	1, 2 and 3
	<b>Assignments</b>	2	10% (10)	2 and 12	1, 2 and 3
	<b>Projects / Lab.</b>	1	10% (10)	Continuous	1, 2 and 3
	<b>Report</b>	1	10% (10)	13	1, 2 and 3
<b>Summative assessment</b>	<b>Midterm Exam</b>	2hr	10% (10)	7	1, 2 and 3
	<b>Final Exam</b>	3hr	50% (50)	16	1, 2 and 3
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Engineering Analysis; Fundamental concepts in engineering analysis Tools and techniques of engineering analysis
Week 2	Mathematical Analysis; Differential equations and their applications in engineering, Differentiation and integration
Week 3	Function Analysis; Algebraic and transcendental functions, Trigonometric and exponential functions
Week 4	Complex Function Analysis; Complex numbers and operations, Analysis of complex functions
Week 5	Mathematical Modeling; Mathematical models of growth, Mathematical models of regression
Week 6	Logistic Regression Analysis; Logistic regression analysis, Applications in engineering
Week 7	Probability and Statistics Analysis; Probability and statistics concepts, Data analysis and probability distributions
Week 8	Advanced Probability and Statistics Analysis; Joint and conditional probability analysis, Advanced statistics analysis and non-normal distributions
Week 9	Linear Regression Analysis; Simple linear regression analysis, Multiple linear regression analysis
Week 10	Nonlinear Regression Analysis; Nonlinear regression analysis, Applications in engineering
Week 11	Optimization Analysis and Optimal Control; Optimization analysis and optimal control problems, Applications in engineering
Week 12	Nonlinear Optimization Analysis; Nonlinear optimization analysis, Applications in engineering
Week 13	Review 1
Week 14	Review 2
Week 15	Review 3
Week 16	Preparatory week before the final Exam

## Delivery Plan (Weekly Lab. Syllabus)

### المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Engineering Analysis and MATLAB.
Week 2	Lab 2: Numerical Methods for Root Finding
Week 3	Lab 3: Interpolation and Curve Fitting
Week 4	Lab 4: Numerical Integration

<b>Week 5</b>	Lab 5: Numerical Solutions of Ordinary Differential Equations (ODEs)
<b>Week 6</b>	Lab 6: Systems of Linear Equations
<b>Week 7</b>	Lab 7: Partial Differential Equations (PDEs)

<b>Learning and Teaching Resources</b> مصادر التعلم والتدريس		
	Text	Available in the Library?
<b>Required Texts</b>	1. "Numerical Methods for Engineers" by Steven C. Chapra and Raymond P. Canale 2. "Numerical Analysis" by Timothy Sauer 3. "Numerical Methods in Engineering with MATLAB" by Jaan Kiusalaas	No
<b>Recommended Texts</b>	1. "Applied Numerical Methods with MATLAB for Engineers and Scientists" by Steven C. Chapra 2. "Numerical Methods: Design, Analysis, and Computer Implementation of Algorithms" by Anne Greenbaum and Timothy P. Chartier	No
<b>Websites</b>	3. ( <a href="https://www.mathworks.com/">https://www.mathworks.com/</a> ) 4. ( <a href="http://www.numericalmethods.eng.usf.edu/">http://www.numericalmethods.eng.usf.edu/</a> ) 5. ( <a href="https://www.engineering.com/">https://www.engineering.com/</a> )	

<b>Grading Scheme</b> 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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F</b> – Fail	راسب	(0-44)	Considerable amount of work required
<b>Note:</b> 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.				