

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics I		Module Delivery
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical Seminar
Module Code	PE 114		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	First
Administering Department	PE	College	CE
Module Leader	Dr. Oday Abdullah	e-mail	oday.abdullah@alnaji-uni.edu.iq
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	PHD
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Name	e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		Semester	
Co-requisites module		Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b></p> <p>أهداف المادة الدراسية</p>	<p>This module is a core subject in engineering education that focuses on understanding how the functions can be pictured as graphs, how they are combined and transformed, and ways they can be classified. It is intended to learn students:</p> <ul style="list-style-type: none"> <li>• Understand the concept of a function</li> <li>• Recognize and classify different types of functions including Trigonometric, exponential, and logarithmic.</li> <li>• Introduce definition of the functions and find domain, co-domain for it then sketched it.</li> <li>• Learn how to sketch the graphs of various types of functions, identifying key features such as intercepts, asymptotes, increasing/decreasing intervals, and turning points.</li> <li>• Define the limit and how it can be used to find the continuity of a function.</li> <li>• Understand the Concept of a Derivative.</li> <li>• Understand and compute higher-order derivatives (second derivatives, third derivatives, etc.) and interpret their meanings, such as concavity and acceleration.</li> </ul>
<p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p>	<p>At the end of the module, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire the ability to think logically and factually, and learning how to generalize the concepts of engineering mathematics</li> <li>2. Learn how functions are pictures as graphs, how they combined and transformed, and ways they can be classified.</li> <li>3. Learn and recruit Logarithmic and Trigonometric Functions in the related mathematical models.</li> <li>4. Learn how to find the limit of function and to understand continuity.</li> <li>5. Understand the rules of differentiation, derivatives of Trigonometric functions, and the Chain Rule.</li> <li>6. Learn how to perform the derivatives of inverse functions and logarithms as well as the derivatives of inverse Trigonometric functions.</li> <li>7. Learn the applications of differentiations in which students can use derivatives to find extreme values of functions and to determine and analyze the shapes of graphs.</li> <li>8. Understand professional, social and ethical responsibilities.</li> <li>9. Communicate effectively.</li> </ol>
<p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>	<p>Introductory Concepts to Functions</p> <ul style="list-style-type: none"> <li>• Functions and Their Graphs</li> <li>• Combining Functions; Shifting and Scaling Graphs</li> <li>• Trigonometric Functions</li> <li>• Exponential Functions</li> <li>• Inverse Functions</li> <li>• Logarithms Functions</li> </ul> <p>Introductory Concepts to limits and Continuity</p> <ul style="list-style-type: none"> <li>• Limit of a Function and Limit Laws</li> <li>• Continuity</li> </ul> <p>Derivatives</p> <ul style="list-style-type: none"> <li>• Differentiation Rules</li> <li>• The Derivative as a Rate of Change</li> <li>• Derivatives of Trigonometric Functions</li> <li>• The Chain Rule</li> <li>• Implicit Differentiation</li> <li>• Derivatives of Inverse Functions and Logarithms</li> <li>• Derivatives of Inverse Trigonometric Functions</li> <li>• Related Rates</li> </ul> <p>Introduction to Graphing Rational Functions</p> <ul style="list-style-type: none"> <li>• Linearization and Differentials</li> </ul> <p>Applications of Differentiations</p> <ul style="list-style-type: none"> <li>• Extreme Values of Functions</li> <li>• The Mean Value Theorem</li> <li>• Monotonic Functions and the First Derivative Test</li> <li>• Concavity and Curve Sketching</li> <li>• Indeterminate Forms and L'Hôpital's Rule</li> </ul>

## Learning and Teaching Strategies

## استراتيجيات التعلم والتعليم

<b>Strategies</b>	<p><b>Lectures:</b> during the week, the theoretical lectures will be presented throughout the semester; the discussion of practical work within the lab will be organized and illustrated with activities.</p> <p><b>Assignments:</b> after the lectures, the assignment will be explained and given to students. It is expected to be done on a weekly basis.</p> <p><b>Quizzes:</b> the contents of each lecture will be discussed during class for open questions and answers to make sure every student will participate and be active.</p> <p><b>Practical Discussion:</b> during the practical session, the students will combine as partners and form a group to discuss their class learning and open tutorials on the topics.</p> <p><b>In class brainstorming sessions:</b> provide students with enough sources and background knowledge briefly within the topics during class to top up their challenge packs to be more active</p>
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## Student Workload (SWL)

الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>150</b>		

## Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>HomeWorks</b>	4	10% (10)	3, 6, 10, and 13	All
	<b>Quizzes</b>	3	30% (30)	4, 11 and 14	All
<b>Summative assessment</b>	<b>Midterm Exam</b>	1hr	10% (10)	8	LO #1 - #5, #8 and #9
	<b>Final Exam</b>	3hr	50% (50)	16	All
<b>Total assessment</b>			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
Week 1	<b>Introductory Concepts to Functions</b> <ul style="list-style-type: none"><li>• Functions and Their Graphs</li><li>• Combining Functions; Shifting and Scaling Graphs</li></ul>
Week 2	<ul style="list-style-type: none"><li>• Trigonometric Functions</li></ul>
Week 3	<ul style="list-style-type: none"><li>• Exponential Functions</li></ul>
Week 4	<ul style="list-style-type: none"><li>• Inverse Functions</li></ul>
Week 5	<ul style="list-style-type: none"><li>• Logarithms Functions</li></ul>
Week 6	<b>Introductory Concepts to limits and Continuity</b> <ul style="list-style-type: none"><li>• Limit of a Function and Limit Laws</li><li>• Continuity</li></ul>
Week 7	<b>Derivatives</b> <ul style="list-style-type: none"><li>• Differentiation Rules</li><li>• The Derivative as a Rate of Change</li></ul>
Week 8	<ul style="list-style-type: none"><li>• Derivatives of Trigonometric Functions</li><li>• The Chain Rule</li></ul>
Week 9	<ul style="list-style-type: none"><li>• Implicit Differentiation</li></ul>
Week 10	<ul style="list-style-type: none"><li>• Derivatives of Inverse Functions and Logarithms</li></ul>
Week 11	<ul style="list-style-type: none"><li>• Derivatives of Inverse Trigonometric Functions</li><li>• Related Rates</li></ul>
Week 12	<b>Introduction to Graphing Rational Functions</b> <ul style="list-style-type: none"><li>• Linearization and Differentials</li></ul>
Week 13	<b>Applications of Differentiations</b> <ul style="list-style-type: none"><li>• Extreme Values of Functions</li><li>• The Mean Value Theorem</li></ul>
Week 14	<ul style="list-style-type: none"><li>• Monotonic Functions and the First Derivative Test</li></ul>
Week 15	<ul style="list-style-type: none"><li>• Concavity and Curve Sketching</li><li>• Indeterminate Forms and L'Hôpital's Rule</li></ul>

## Learning and Teaching Resources

### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Text and Books</b>	<ul style="list-style-type: none"> <li>“Thomas Calculus” G. Thomas, M. Weir, et al., 13th edition, 2014.</li> </ul>	Yes
<b>Recommended Texts</b>		
<b>Websites</b>		

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