استمارة وصف البرنامج الأكاديمي للكليات والمعاهد

للعام الدراسي ٢٠٢٣-٢٠٢٤

الجامعة : : تكريت

الكلية/ المعهد: كلية هندسة العمليات النفطية

القسم العلمي   : هندسة سيطرة المنظومات النفطية

تاريخ ملء الملف : ٢٠٢٣/١١/٢٥

التوقيع   :

اسم رئيس القسم :   م. ياسين خضر ياسين

التاريخ : ٢٠٢٣/١١/٢٨

التوقيع :

اسم المعاون العلمي : ا.م.د.عمر ياسين ضايع

التاريخ : ٢٠٢٣/١٢/٣

دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي: م.م أيوب إبراهيم محمد

التاريخ : ٢٠٢٣/١١/٢٨

التوقيع :

مصادقة السيد العميد

أ.م.د غسان حمد عبد الله

٢٠٢٣/١٢/٣

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Petroleum Process Engineering
Department of Petroleum System Control
Engineering

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	MATHEMATICS I	Module Delivery	
Module Type	BASIC	☒ **Theory**	
Module Code	PCS113	☐ **Lecture**	
		☐ **Lab**	
ECTS Credits	6	☒ **Tutorial**	
SWL (hr/sem)	150	☐ **Practical**	
		☐ **Seminar**	

Module Level	1	Semester of Delivery	1
Administering Department	PCS	**College**	PPE
Module Leader	Ali H. Mhmood	**e-mail**	ali.h.mhmood@tu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1

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 أهداف المادة الدراسية	1. To understand functions, their domains and ranges, and how to graph them.
	2. To explore trigonometric functions, exponential functions, and piecewise-defined functions.
	3. To distinguish between even and odd functions and become familiar with common functions.
	4. To comprehend rates of change, tangents to curves, limit laws, the Sandwich Theorem, and one-sided and two-sided limits.
	5. To grasp concepts of continuity, limits involving infinity, and asymptotes of graphs.
	6. To investigate tangents, derivatives at a point, the derivative as a function, one-sided derivatives, and the relationship between differentiability and continuity on an interval.
	7. To understand differentiation rules, second- and higher-order derivatives, and derivatives of trigonometric functions.
	8. To learn the chain rule, implicit differentiation, and techniques for linearization and differentials.
	9. To apply derivatives to find extreme values of functions and comprehend the Mean Value Theorem.
	10. To analyze the graphical behavior of functions using derivatives and explore examples from mathematics and physics.
	11. To further explore examples from mathematics and physics using derivative applications.
	12. To understand the concept of area, estimation with finite sums, definite integrals, and integrable and nonintegrable functions.
	13. To explore properties of definite integrals, the area under the graph of nonnegative functions, and the Fundamental Theorem of Calculus.
	14. To master indefinite integrals and the substitution method, integrate trigonometric functions, and solve problems involving substitution and area between curves.
Module Learning	1. Define functions, determine domains and ranges, and graph various

Outcomes مخرجات التعلم للمادة الدراسية	functions accurately. 2. Apply understanding of functions to trigonometric, exponential, and piecewise-defined functions. 3. Differentiate between even and odd functions and recognize common functions. 4. Calculate rates of change, find tangents to curves, apply limit laws, use the Sandwich Theorem, and evaluate one-sided and two-sided limits. 5. Understand continuity, limits involving infinity, and identify asymptotes of graphs. 6. Define tangents, comprehend derivatives at a point, understand the derivative as a function, calculate one-sided derivatives, and establish the relationship between differentiability and continuity on an interval. 7. Apply differentiation rules, compute second- and higher-order derivatives, and differentiate trigonometric functions. 8. Utilize the chain rule, apply implicit differentiation, and employ linearization and differentials. 9. Find extreme values of functions and understand the Mean Value Theorem and its applications. 10. Analyze the graphical behavior of functions using derivatives and solve mathematical and physical problems. 11. Gain further insight into the application of derivatives in mathematics and physics through additional examples and problem-solving. 12. Estimate area using finite sums, understand the concept of the definite integral, and differentiate between integrable and nonintegrable functions. 13. Apply properties of definite integrals, calculate the area under the graph of nonnegative functions, and comprehend the Fundamental Theorem of Calculus. 14. Master the evaluation of indefinite integrals using the substitution method, integrate trigonometric functions, and solve problems related to substitution and finding the area between curves.
Indicative Contents المحتويات الإرشادية	1. Functions and Their Graphs: Functions; Domain and Range; Graphs of

Functions; Trigonometric Functions; Exponential Functions; Piecewise-Defined Functions; Even Functions and Odd Functions; Common Functions. [6 hrs]

2. Limits and Continuity: Rates of Change and Tangents to Curves; Limit Laws; The Sandwich Theorem; Continuity; Limits Involving Infinity; Asymptotes of Graphs. [4 hrs]

3. Differentiation: Tangents and the Derivative at a Point; The Derivative as a Function; One-Sided Derivatives; Differentiability and Continuity on an Interval; Differentiation Rules; Second- and Higher-Order Derivatives; Derivatives of Trigonometric Functions; The Chain Rule; Implicit Differentiation; Linearization and Differentials. [6 hrs]

4. Applications of Derivatives: Extreme Values of Functions; The Mean Value Theorem; Graphical Behavior of Functions from Derivatives; Examples from Mathematics and Physics. [6 hrs]

5. Integration: Area and Estimating with Finite Sums; The Definite Integral; Integrable and Nonintegrable Functions; Properties of Definite Integrals; Area Under the Graph of a Nonnegative Function; The Fundamental Theorem of Calculus; Indefinite Integrals and the Substitution Method; The Integrals of Trigonometric Functions; Substitution and Area Between Curves. [6 hrs]

| Learning and Teaching Strategies |
| استراتيجيات التعلم والتعليم |

| Strategies | The learning and teaching strategies of this course involve implementing active learning strategies that engage students in discussions, problem-solving, and group work. Visuals and graphical representations are utilized to enhance understanding, while real-world examples and applications make the content relevant. Technology tools are integrated to facilitate dynamic visualization and provide immediate feedback. The course content is structured progressively, with clear objectives and breakdown of complex topics. Formative assessments and timely feedback are used to gauge understanding. Application-based projects foster critical thinking and problem-solving skills. Collaborative learning is encouraged, and individualized support is provided to struggling students. Reflection activities promote metacognition and self-regulation. By employing these strategies, students actively engage with the material and develop a solid understanding of calculus concepts and their practical applications. |

<table>
<tr><th colspan="4">Student Workload (SWL)
الحمل الدراسي للطالب</th></tr>
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Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	59	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	4, 11	LO #1, 2, 3, 7, 8, 9, and 10
	Assignments	5	15% (15)	Continuous	
	Projects / Lab.	-	-	-	-
	Report	1	5% (5)	14	All
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Functions and Their Graphs: Functions; Domain and Range; Graphs of Functions
Week 2	Functions and Their Graphs: Trigonometric Functions; Exponential Functions; Piecewise-Defined Functions
Week 3	Functions and Their Graphs: Even Functions and Odd Functions; Common Functions
Week 4	Limits and Continuity: Rates of Change and Tangents to Curves; Limit Laws; The Sandwich Theorem; One-Sided and Two-Sided Limits
Week 5	Limits and Continuity: Continuity; Limits Involving Infinity; Asymptotes of Graphs
Week 6	Differentiation: Tangents and the Derivative at a Point; The Derivative as a Function; One-Sided Derivatives; Differentiability and Continuity on an Interval
Week 7	Differentiation: Differentiation Rules; Second- and Higher-Order Derivatives; Derivatives of Trigonometric Functions
Week 8	Differentiation: The Chain Rule; Implicit Differentiation; Linearization and Differentials
Week 9	Applications of Derivatives: Extreme Values of Functions; The Mean Value Theorem
Week 10	Applications of Derivatives: Graphical Behavior of Functions from Derivatives, Examples from Mathematics and Physics

Week 11	Applications of Derivatives: Examples from Mathematics and Physics
Week 12	Integration: Area and Estimating with Finite Sums; The Definite Integral; Integrable and Nonintegrable Functions
Week 13	Integration: Properties of Definite Integrals; Area Under the Graph of a Nonnegative Function; The Fundamental Theorem of Calculus
Week 14	Integration: Indefinite Integrals and the Substitution Method, The Integrals of Trigonometric Functions, Substitution and Area Between Curves
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' calculus 11 ed. 2004	Yes
Recommended Texts	Solution Manual of Thomas' calculus 11 ed. 2004	No
Websites	https://ced.ceng.tu.edu.iq/electronic-lectures/381-%D9%85%D8%AD%D8%A7%D8%B6%D8%B1%D8%A7%D8%AA-%D9%85%D8%A7%D8%AF%D8%A9-%D8%A7%D9%84%D8%B1%D9%8A%D8%A7%D8%B6%D9%8A%D8%A7%D8%AA-%D8%A7%D9%84%D9%85%D8%B1%D8%AD%D9%84%D8%A9-%D8%A7%D9%84%D8%A3%D9%88%D9%84%D9%89.html	

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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.