MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics II			**Module Delivery**	
Module Type	S			☒**Theory** ☒**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	UOMU011031				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	1	
Administering Department			**College**	Type College Code	
Module Leader	Alaa Muhammad Hussein		**e-mail**	alaa.mohammed@uomus.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**	Dr	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	14/9/2024		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	UOMU011022	**Semester**	1
Co-requisites module	Mathematics I	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Our Main Goal in this module is to introduce a number of many concepts motivated through mathematical applications. These applications build from the basic mathematical content to create a path into whole fields that are rooted in calculus. Also added material on applications of differentials and partial derivatives as a definitive application for both of these topics in thermodynamics, physically, … etc.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 Learn how to write and graph parametric equations in polar form, and see how calculus can be used to study these graphs. Analyze and write equations of a parabola, ellipse, and hyperbola in polar form. 2 Sketch a curve represented by parametric equations and use them to find the slope of a tangent line to a curve and the arc length of a curves. 3 Find length, area of a region bounded by a polar graph. 4 Introduces vectors in two-dimensional and in three-dimensional. 5 Write vectors, perform basic vector operations, and represent them graphically. 6 Plot points in three-dimensional coordinate system, analyze vectors in space. 7 Find the dot product and cross product of two vectors (in plane or in space). 8 Recognize and write equations of cylindrical and quadric surfaces and of surfaces of revaluation. 9 Use cylindrical and spherical coordinates to represent surfaces in space. 10 Analyze and sketch a space curve represented by a vector-valued functions and applied limits, continuity, differentiate and integrate to them. 11 Describe velocity and acceleration associated with a vector-valued function and used them to analyze projectile motion, arc length, curvature of curve. 12 Introduces functions of more than one independent variables. Find limit, continuity, partial derivative, derivative implicitly, total differential by using chain rule. 13 Introduces double integrals over regions in plane and triple integrals over regions in space. Evaluate area, volume, mass, first moments, second moment or moment of inertia, also evaluate double (triple) in polar coordinate (cylindrical and spherical coordinates).
Indicative Contents المحتويات الإرشادية	Instructional content includes the following. Part A - Polar coordinates Define Polar coordinates and how to find Areas, Lengths, and Conic Sections. Also, introduce and represent Three-Dimensional Space with the application to find Distance and Spheres. Part B – Vectors Represent Vectors in two and three-dimensional spaces, also study how to use them to find the magnitude, scalar, dot product, and cross product in both spaces. Describe Vector-Valued Functions of Single Variable, Limit and Continuity, Derivative, Integration, and Parametric Equations. Part C - Partial derivative

	Define functions of two or more independent variables, find limit, continuity, and differentiable, Introduce Chain Rule, Jacobian, Normal, and Tangent Planes to Surfaces, and the Gradient of these functions. Part D – Double, Triple Integrals Properties, Volume, Reversing the Order of Integration, and how to find Mass, Average Value, First Moments, Center, Moments of inertia and Radii of gyration, by using many Coordinates. Also introduce and find the area by using Lagrange, Trapezoidal, Simpson's Rule.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1 Using the Blackboard and Wide Screen to Introduce the Students to this Module, we also let the students to participate in the problem solving process in the class and by giving them homework; 2 Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture; 3 Personal Video Lecture material placed on YouTube or other e-learning environment; 4 External Printed lectures or References from industry; 5 Obviously, Small group tutorial sessions inside the class make more ideas useful and easier to understand how to solve the Material of this module; 6 Question and answer sessions during lectures or staff Office Hours; 7 Guided reading of texts, journal articles … etc., for individual and group projects.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	4	20(20%)	4,7,10,14	1-2,11,12,13
	Assignments	1	5(5%)	8	10
	Projects / Lab.				
	Report	1	5(5%)	15	7

Summative assessment	**Midterm Exam**	2	20 (20 %)	6,12	3-6,8-9
	Final Exam	1	50 (50 %)	16	14
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review Polar coordinates and Graphing it, Find Areas, Lengths and Conic Sections by using Polar coordinates, Three-Dim Space, Distance and Spheres in it.
Week 2	Vectors, magnitude or length, scalar and dot product, cross product, lines and planes in space.
Week 3	Vector Valued Functions of Single Variable, Limit and Continuity.
Week 4	Derivative, Integration, velocity, acceleration, Curvature, Unit Normal Vector N.
Week 5	Parametric Equations for Ideal Projectile Motion, Arc Length and Unit Tangent Vector.
Week 6	Partial derivative: functions of two or more independent variables and limit.
Week 7	Partial derivatives, continuity and differentiable functions.
Week 8	Total Differentia, Chain Rule and Jacobian.
Week 9	Normal Lines and Tangent Planes to Surfaces, the Gradient of Function.
Week 10	Finding Mass, Center of Mass, Moment of Inertia, Radius of Gyration
Week 11	Double, Triple Integrals, Properties, Volume and Reversing the Order of Integration.
Week 12	Mass, Average Value, First Moments, Center, Moments of inertia and Radii of gyration.
Week 13	Double Integrals in Polar Form.
Week 14	Triple Integrals in Cylindrical and Spherical Coordinates.
Week 15	Lagrange, Trapezoidal, Simpson's Rule
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas_Calculus_11th Edition	Yes
Recommended Texts	1. Calculus-Courses-Adams 2010 2. Calculus-Edwards2010 3. Differential Equations for Engineers 2010 4. Multivariable Calculus & Analysis 2010	No

Websites	

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.