

Module Information					
معلومات المادة الدراسية					
Module Title	Advanced Mathematics		Module Delivery		
Module Type	Core		<div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input type="checkbox"/> Lab</div> <div><input checked="" type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div>		
Module Code	UOMU023036				
ECTS Credits	4				
SWL (hr/sem)	210				
Module Level		UGII			Semester of Delivery
Administering Department		Technical building and Construction	College	Al-Mustaqbal university	
Module Leader	Baneen Mohammed Hilal		e-mail	baneen.mohammed.hilal@uomus.edu.iq	
Module Leader’s Acad. Title		Ass.lec.	Module Leader’s Qualification		
Module Tutor			e-mail		
Peer Reviewer Name		Ass.lec.Alaa Haseen	e-mail		
Scientific Committee Approval Date			Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Applied Mathematics	Semester	L 1 S1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	The student must know the advanced theories in mathematics needed in construction engineering .

Module Learning Outcomes	<p>Upon completion of the course, students should be able to:</p> <ol style="list-style-type: none"> 1. Skill of thinking 2. Skill of conclusion and evaluation 3. Skill analysis 4. The skill of observation 5. The student's ability to excel and cognitive perception to diagnose theories and general 6. Principles in the study. 7. Future planning to link, what students learn in daily life. 8. Practice different patterns in mathematical proofs. 9. Self-reliance in getting to the idea and how to manage solving the scientific problem. 10. Statistical concepts and applications in civil engineering. 11. Critical Thinking 12. Analytical methods in solving problems 13. Identify operational problems to carry out civil engineering studies and evaluate alternative solutions.
Indicative Contents	<p>Multiple integrals ,double integrals , area by double integration , triple integrals , volume by double and triple integrations. [4 hrs.]</p> <p>Polar coordinates , curves by polar coordinates ,area by polar double integrations , cylindrical and spherical coordinates, equations of solids</p> <p>Ordinary differential equations of first order ,separable , homogeneous , exact and not exact , linear and Bernoulli first order equations , general and condition solutions , applications. [4 hrs.]</p> <p>Linear differential equations with constant coefficients, homogeneous and non-homogeneous equations , equation of higher order , general and condition solutions , applications. [4 hrs.]</p> <p>Partial derivatives with two and more two variables , higher- order partial derivatives , chain rule for partial derivatives , maxima & minima of function of two variables , saddle point and relative extrema. [4 hrs.]</p> <p>Vector analysis , dot and cross product of vector functions , velocity and acceleration ,gradient of vector fields,divergance and curl of vector fields .</p> <p>Equations of the lines and surfaces in space , intersection of lines and surfaces using vectors , lagrange multipliers with two and more constraints.</p> <p>Complex numbers and functions , demoivres theorem, roots ,argand diagram, cauchy – rehmann equations. [4 hrs.]</p> <p>Limits , Infinite sequences , convergence and divergence , infinite series , geometric and ordinary series , positive and alternative series , test of convergences. [4 hrs.]</p> <p>Power series , maclaurin series taylor and trigonometric series .</p>

	<p>Fourier series for periodic function , euler coefficients , applications</p> <p>Green,s theorem for enclosed curves , line integral. [4 hrs.]</p> <p>Matrices , Adjoins & inverses , solving linear equations using the inverse of matrix , determinants and cramer method to solve linear equations , Gaussian elimination and gauss-seidel elimination. [4 hrs.]</p> <p>Improper integration and Laplace transform of some common functions , properties of Laplace transform. [4 hrs.]</p>
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<p>Assessment is based on</p> <ol style="list-style-type: none"> 1. Exams. 2. Student feedback. 3. Preparation of scientific reports.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem)	129	Structured SWL (h/w)	9
Unstructured SWL (h/sem)	81	Unstructured SWL (h/w)	5
Total SWL (h/sem)	210		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20% (20)	3,5,6,10	
	Assignments	2	10% (10)	7, 8	
	Seminar	1	10% (10)	11	
Summative assessment	Midterm Exam	2 hr	10% (10)	12	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري محتوى كل اسبوع يجب ان يغطي الوقت المحدد

	Material Covered
Week 1	Multiple integrals ,double integrals , area by double integration , triple integrals , volume by double and triple integrations.
Week 2	Polar coordinates , curves by polar coordinates ,area by polar double integrations , cylindrical and spherical coordinates, equations of solids
Week 3	Ordinary differential equations of first order ,separable , homogeneous , exact and not exact , linear and Bernoulli first order equations , general and condition solutions , applications
Week 4	Linear differential equations with constant coefficients, homogeneous and non-homogeneous equations , equation of higher order , general and condition solutions , applications.
Week 5	Partial derivatives with two and more two variables , higher- order partial derivatives , chain rule for partial derivatives , maxima & minima of function of two variables , saddle point and relative extrema.
Week 6	Vector analysis , dot and cross product of vector functions , velocity and acceleration ,gradient of vector fields,divergance and curl of vector fields .
Week 7	Equations of the lines and surfaces in space , intersection of lines and surfaces using vectors , lagrange multipliers with two and more constraints.
Week 8	Complex numbers and functions , demoivres theorem, roots ,argand diagram, cauchy – rehmann equations.
Week 9	Limits , Infinite sequences , convergence and divergence , infinite series , geometric and ordinary series , positive and alternative series , test of convergences
Week 10	Power series , maclaurin series taylor and trigonometric series .
Week 11	Fourier series for periodic function , euler coefficients , applications
Week 12	Green's theorem for enclosed curves , line integral
Week 13	Matrices , Adjoins & inverses , solving linear equations using the inverse of matrix , determinants and cramer method to solve linear equations , Gaussian elimination and gauss-seidel elimination.
Week 14	Improper integration and Laplace transform of some common functions, properties of Laplace transform.
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<ol style="list-style-type: none"> Advanced Engineering Mathematics /C. Ray Wylie Engineering mathematics / G. S . Sharma &I . J. S . Sarna Applied Mathematics for Engineers & physicists / Pipes & Harvill . 	
Recommended Texts		

Websites		
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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.				