

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics II		Module Delivery
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	PE123		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	
Administering Department	Petroleum Engineering	College	Collage of Engineering
Module Leader	Mohammed Khalaf Ulaiwi	e-mail	mohammed.khalaf@alayen.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Mohammed Khalaf Ulaiwi	e-mail	mohammed.khalaf@alayen.edu.iq
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PE114	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The course aims to enable students to: 1. Develop a solid understanding of integral calculus, including basic techniques of integration and their applications. 2. Apply different methods of integration such as substitution, integration by parts, partial fractions, and trigonometric integrals. 3. Evaluate definite and improper integrals and interpret their geometrical engineering applications. 4. Apply integration techniques to solve engineering problems, including areas, volumes, and arc lengths.



	- Analyze and solve problems involving matrices, including matrix operations such as addition, multiplication, and inverse matrices. - Compute determinants of matrices and apply them in solving systems of linear equations. - Understand vectors and vector algebra, including vector operations such as addition, scalar multiplication, dot product, and cross product. - Understand complex numbers and perform operations involving complex numbers in algebraic and polar forms. - Develop the ability to model and solve engineering problems using mathematical methods. - Enhance analytical thinking and systematic problem-solving skills required for engineering studies.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A2.1: Describe the introductory concepts of integration, including antiderivatives and the fundamental principles of integral calculus. A2.2: Identify engineering and mathematical applications of integration in solving practical problems. A2.3: Explain the applications of definite integrals in solving problems related to areas, volumes, and other geometrical quantities. A2.4: Identify integrals involving transcendental functions, including exponential, logarithmic, and trigonometric functions. A2.5: Recognize various techniques of integration, such as substitution, integration by parts, partial fractions, and trigonometric integrals. A2.6: Explain the basic concepts of determinants and matrices, including their properties and mathematical foundations. A2.7: Describe the fundamental principles of vectors, including vector representation, magnitude, direction, and basic vector operations. A2.8: Explain the basic concepts of complex variables, including algebraic operations and representations of complex numbers.
		B1	B1.1: Function efficiently as an individual. B1.2: Function as a member of multidisciplinary and multicultural teams.
		B2	B2.1: Communicate effectively—graphically—with a range of audiences using contemporary tools. B2.2: Communicate verbally and in writing with a range of audiences using contemporary tools.
		C1	C1.1: Define professional and ethical responsibilities. C1.2: Demonstrate diversity in their commitment to ethical responsibilities.
		C2	C2.1: Plan engineering projects, taking into consideration other trades' requirements. C2.2: Supervise and monitor engineering projects, taking into consideration other trades' requirements.
Indicative Contents المحتويات الإرشادية	- Introductory Concepts to Integration. - Antiderivatives and indefinite integrals. - Applications of Definite Integrals.		

	• Areas under curves. • Volumes of solids of revolution. • Arc length and surface area calculations 3. Integrals and Transcendental Functions. • Integration of exponential, logarithmic, and trigonometric functions. • Special integrals involving inverse trigonometric functions 4. Techniques of Integration. • Substitution method. • Integration by parts. • Partial fractions. • Trigonometric integrals and trigonometric substitution. 5. Determinants and Matrices. • Introductory Concepts to Determinants. • Introductory Concepts to Matrices. 6. Vectors. • Introductory Concepts to Vector. • Vector operations: addition, scalar multiplication, dot product, cross product. 7. Complex Variables. • Algebra of complex numbers. • Operations: addition, subtraction, multiplication, division 8. Applications of Integration. • Engineering applications: center of mass, moments of inertia. • Physics applications: work, energy, fluid flow problems
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Presentation and demonstration. • Interactive learning. • Discussions and Q&A. • Problems solving. • Brain storming. • Report and assignments. • Self-learning tasks.

Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 7	A2.1, A2.2, A2.3 and A2.4
	Assignments	2	10% (10)	4 and 10	A1.1, A2.2, A2.4, B1.1 and B2.1
	Interaction within the class	2	10% (10)	All	
	Report	1	10% (10)	5	A2.2, A2.3, B1.2 and B2.1
Summative assessment	Midterm Exam	1hr	10% (10)	8	A2.1, A2.2, A2.3, A2.4 and A2.5
	Final Exam	3hr	50% (50)	16	A2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	Introductory Concepts to Integration.	A2.1, A2.2, B1.1 and C1.1
Week 2	Integrals. - The Definite Integral. - Definite Integral Substitutions and the Area Between Curves	A2.1, A2.2, A2.3, B2.1, C1.1 and C1.2
Week 3	Indefinite Integrals and the Substitution Method.	A2.2, A2.3, B1.1, B1.2, C1.1 and C1.2
Week 4	Applications of Definite Integrals. - Volumes Using Cross-Sections. - Volumes Using Cylindrical Shells.	A2.2, A2.3, B2.1, C1.1 and C1.2
Week 5	- Arc Length. - Areas of Surfaces of Revolution.	A2.2, A2.3, B2.1, C1.1 and C1.2
Week 6	Integrals and Transcendental Functions. - The Logarithm Defined as an Integral. - Exponential Change and Separable Differential Equations.	A2.2, A2.3, B2.1, C1.1, C1.2 and C2.1
Week 7	- Hyperbolic Functions. - Relative Rates of Growth	A2.2, A2.4, B2.1, C1.1, C1.2 and C2.1
Week 8	Techniques of Integration. - Integration by Parts. - Trigonometric Integrals.	A2.1, A2.2, A2.4, A2.5, B2.2, C1.2 and C2.1
Week 9	Trigonometric Substitutions.	A2.1, A2.2, A2.4, A2.5, B2.2, C1.2 and C2.1

Week 10	Integration of Rational Functions by Partial Fractions.	A2.1, A2.2, A2.4, A2.5, B2.2, C1.2 and C2.1
Week 11	- Integral Table and Computer Algebra Systems. - Numerical Integration.	A2.1, A2.2, A2.4, A2.5, B2.2, C1.2 and C2.1
Week 12	Determinants and Matrices. - Introductory Concepts to Determinants. - Introductory Concepts to Matrices	A2.6, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 13	Vectors. - Introductory Concepts to Vector. - Vector operations: addition, scalar multiplication, dot product, cross product	A2.7, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 14	Complex Variables.	A2.8, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 15	Applications of Integration. - Engineering applications: center of mass, moments of inertia. - Physics applications: work, energy, fluid flow problems	A2.2, A2.3, A2.4, A2.5, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 16	Preparatory week before the final Exam	All

Learning and Teaching Resources				
مصادر التعلم والتدريس				
	Text		Available in the Library?	
Required Texts	"Thomas Calculus" G. Thomas, M. Weir, et al., 13th edition, 2014.		Yes	
Recommended Texts				
Websites	https://alayan.edu.iq/entry_links			
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.