Ministry of Higher Education and
Scientific Research - Iraq
University of Diyala
College of Artificial Intelligence Engineering Technology
Department of Artificial Intelligence Engineering

الملحق 4: وصف المادة الدراسية

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**E 102**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester (s) offered**	2	
Administering Department	AI. Eng.		**College**	College of Artificial Intelligence Engineering Technology	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	E 101	**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	This module aims to provide students with an understanding of, and competence in the use of, mathematical techniques that are relevant to the solution of engineering problems. It will also give students a firm foundation from which to develop solutions to a wider and deeper range of engineering problems that they will encounter throughout their undergraduate engineering program of study.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Integration: Demonstrate an understanding of the fundamental concept of integration and antiderivative including types of integrations 2. Integration and transcendental functions: Extend the concept of integration to cover the integration of different types of transcendental functions 3. Numerical integration: Explain the fundamentals of numerical integration focusing on trapezoidal rule and Simpson's rule. 4. Methods of integration: Apply the techniques of integration to evaluate the integrals that cannot be solved directly. 5. Application of definite integrals: Extend the concept of integration to solve several problems involving area, volume, length of curve, surface area by revolution, center of mass and moment of inertia. 6. Area with polar coordinates: Demonstrate an understanding of polar coordinate system and its difference with Cartesian coordinate system, graphing and problems solution of such system. 7. Matrix: Explain the concept of matrix in mathematics, matrix algebra and solution of system of linear equations.
Indicative Contents المحتويات الإرشادية	The topics listed under the indicative content below are the underpinning areas of knowledge and understanding that will be obtained from successful completion of the module. The mathematical topics are illustrated in the context of relevant engineering scenarios. • **Integration:** Definition, antiderivative, definite and indefinite integral. • **Integration and transcendental functions:** integration of trigonometric and inverse trigonometric functions, integration of exponential and logarithmic functions, Integration of hyperbolic and inverse hyperbolic functions. • **Numerical integration:** Introduction, trapezoidal rule and

	Simpson's rule. • **Methods of integration:** Substitution method, integration by parts, Trigonometric substitution method, integration by partial fraction. • **Application of definite integrals:** Area, Volume, Lengths of curves in the plane, Areas of surfaces of revolution, Center of mass, moment of inertia. • **Area of polar coordinates**: Definition, polar equation, relating polar and Cartesian coordinates, Graph in polar coordinates, applications using polar coordinate system • **Matrix:** definition, matrix algebra, Determinant of matrix, Grammar's rule, Inverse of matrix, Gauss Elimination Method
Course Description	This course discusses the foundation for a robust understanding of mathematical concepts that underpin the various disciplines within engineering. It covers the integration and its types followed by methods of integration. The concept of numerical integration is also highlighted. Students will be able to utilize integration to solve several problems such as area between curves and volume by revolution. A focus is also given to the understanding of polar coordinate system and how to graph the curves and solve difficult integral in an easy way using such system. Matrix topic is also covered in this course so the students will be able to solve system of linear equations using matrix in different approaches. By the end of the course, students will have a sound understanding of these principles, preparing them for more advanced engineering courses in their respective fields

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Begin In Mathematics II, then employ a range of teaching strategies to ensure first-year engineering students fully grasp the various mathematical concepts. Instructional methods include interactive lectures, where core mathematical principles are explained in detail, and practical problem-solving sessions to provide hands-on learning experiences. Collaborative group work encourages peer-to-peer learning and reinforces understanding through shared insights. Regular formative assessments

	will be conducted to monitor students' understanding of the material, and feedback will be promptly given to guide their learning process. Instructors will maintain office hours for personalized support, and online resources will be available to supplement classroom instruction. Emphasis will be placed on relating mathematical concepts to real-world engineering applications to make the learning experience more relevant and engaging. These strategies aim to develop students' critical thinking skills, enhance their problem-solving abilities, and prepare them for advanced engineering studies.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** 53 **In class tests** 10 **Tutorial** 15		**78**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**5.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Assignment** 20 **Preparation for tests** 30 **Homework** 22		**72**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**4.8**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		**150**		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	**2**	**20% (20)**	**3,5, 10, 12, 14**	**LO #1, 2, 3, 4 ,5 and 7**
	Assignments	**6**	**20% (20)**	**4, 8, 12**	**LO # 1, 2, 3, 4, 5 and 6**
Summative	**Midterm Exam**	**1**	**10% (10)**	**7**	**LO # 1,4**

assessment	**Final Exam**	**3**	**50% (50)**	**16**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Integration:** Definition, antiderivative, definite and indefinite integral
Week 2	**Integration and transcendental functions:** (trigonometric and inverse trigonometric functions, exponential and logarithmic functions)
Week 3	**Integration and transcendental functions:** Integration and transcendental functions (hyperbolic and inverse hyperbolic functions)
Week 4	**Numerical integration** Introduction, trapezoidal rule and Simpson's rule
Week 5	**Methods of integration** Substitution method, integration by parts
Week 6	**Methods of integration** Trigonometric substitution method
Week 7	**Methods of integration** Integration by partial fraction method**.**
Week 8	**Application of definite integrals** Areas under the curve, area between curves,
Week 9	**Application of definite integrals** Volume by revolution
Week 10	**Application of definite integrals** Length of curve in the plane**,** Area of surface of revolution
Week 11	**Application of definite integrals** Center of mass, moment of inertia
Week 12	**Application of definite integrals** Area by polar coordinates
Week 13	**Matrix** Definition, matrix algebra
Week 14	**Matrix** Determinant of matrix, Grammar's rule
Week 15	**Matrix**

	Inverse of matrix, Gauss Elimination Method
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry, Addison- Wesley	Yes
Recommended Texts	Thomas Calculus, by George B.Thomas,Jr,Elevnth Edition Media Upgrade 2008	Yes
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	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.