Ministry of Higher Education and Scientific Research - Iraq
University of Diyala
College of Engineering
Department of Computer Engineering

الملحق ٤: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Applied Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒**Theory** ☒**Lecture** ☐ **Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**CPE 202**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Computer Eng.		**College**	College of Engineering	
Module Leader	Zobeda Hatif Naji		**e-mail**	zobedadahatifnaji@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor	Zobeda Hatif Naji		**e-mail**	zobedahatifnaji@uodiyala.edu.iq	
Peer Reviewer Name	Hussien Y. Radhi Raghda Salam Ali		**e-mail**	hussienradh_eng@uodiyala.edu.iq raghdasalam@uodiyala.edu.iq	
Scientific Committee Approval Date	02/06/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	CPE 201	**Semester**	3
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Upon completion of this course, the student will be able to understand: 1. Mathematics develops the mind to think in a logical and critical manner, hence enhancing the capacity to methodically tackle and resolve issues. 2. Mathematics enables individuals to comprehend and articulate patterns, connections, and structures seen in the natural world, ranging from planetary orbits to musical rhythms. 3. Developing Analytical Skills: Engaging in the study of mathematics improves one's ability to think analytically, enabling individuals to deconstruct intricate situations into more manageable components and comprehend the fundamental laws that govern them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon Completion this Course, the students will 1. Understand the fundamental elements of relational mathematical applied material. 2. Know the ordinary equation, its types, applications, and Partial Differential Equations (PDEs) 3. Understanding Multiple integrals and will be able to solve the problem. 4. Know the principles of Wavelet and solve the problem. 5. Understand the basic concepts of PDEs, Modeling: Vibrating, String, Wave Equation, Solution by Separating Variables. 6. How to use of Fourier Series, Laplacian in Polar Coordinates, Fourier–Bessel Series, Laplace's Equation in Cylindrical and Spherical Coordinates.
Indicative Contents المحتويات الإرشادية	1. First-Order ODEs: Separable ODEs. Modeling, Exact ODEs. Integrating Factors(3hr) 2. Existence and Uniqueness of Solutions for (IVP)(2hr) 3. Applied problems(2hr) 4. Second-Order Linear ODEs: Homogeneous Linear ODEs of Second Order(2hrs) 5. Homogeneous Linear ODEs with Constant Coefficients(2hrs) 6. Nonhomogeneous ODEs and Applied problems(2hrs) 7. Multiple integral: Mathematical definition(4hr) 8. Methods of integration(4hrs) 9.Multiple improper integral(2hrs) 10. Multiple integrals and iterated integrals(2hrs) 11.Some practical applications(3hrs) 12. Partial Differential Equations: Basic Concepts of PDEs(2hr) 13. Modeling: Vibrating String, Wave Equation(5hrs) 14.Solution by Separating Variables. Use of Fourier Series(2hrs) 15. Laplacian in Polar Coordinates. Fourier–Bessel Series(2hrs) 16. Laplace's Equation in Cylindrical and Spherical Coordinates. (2hrs) 17.Solution of PDEs by Laplace Transforms(2hrs) 18. Wavelet(1hr) 19. Wavelet bases for discrete and continuous variables. (2hrs) 20.The Haar basis. (1hr) 21. Differentiable wavelet bases(1hr).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, homework's and examples. Practical examples helps students to understand the course material.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**48**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**3.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**52**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**3.5**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**2**	**20% (10)**	**2 and 13**	**LO #2 and #5**
	Assignments	**2**	**10% (5)**	**11 and 14**	**LO #1 and #6**
	Class work	**2**	**10% (5)**		
	Home work				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	**1 hr**	**10% (10)**	**9**	**LO #1 - #4**
	Final Exam	**3 hr**	**50% (50)**	**16**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to First-Order ODEs Separable ODEs. Modeling
Week 2	Exact ODEs. Integrating Factors, Existence and Uniqueness of Solutions for (IVP), Applied problems
Week 3	Second-Order Linear ODEs, Homogeneous Linear ODEs of Second Order, Homogeneous Linear ODEs with Constant Coefficients.
Week 4	Multiple integral: Mathematical definition, Methods of integration.
Week 5	Multiple improper integral, Multiple integrals and iterated integral.
Week 6	Some practical applications.
Week 7	Partial Differential Equations: Basic Concepts of PDEs, Modeling: Vibrating String, Wave Equation.
Week 8	Solution by Separating Variables. Use of Fourier Series.
Week 9	Laplacian in Polar Coordinates. Fourier–Bessel Series
Week 10	3.1.5 Laplace's Equation in Cylindrical and Spherical Coordinates.
Week 11	Solution of PDEs by Laplace Transforms
Week 12	Wavelet
Week 13	Wavelet bases for discrete and continuous variables. The Haar basis. Differentiable wavelet bases
Week 14	Course Report.
Week 15	Midterm Exam.
Week 16	Preparatory week before the 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	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Len Jacobson: "GNSS Markets and Applications". Artech House, 2007.	Yes
Recommended Texts	T. E. G. A. (GSA): "GNSS Market Report", 2015. Bernhard Hofmann-Wellenhof, Herbert Lichtenegger, Elmar Wasle,"GNSS – Global *Navigation Satellite Systems GPS, GLONASS, Galileo, and more*". Springer, 2008.	Yes
Websites	https://mathdf.com/dif/	

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.