Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2025

Academic Program Description Form

University Name: University of Mosul
Faculty/Institute: College of Computer Science and Mathematics
Scientific Department: Department of Mathematics
Academic or Professional Program Name: Bachelor of Science in Mathematics
Final Certificate Name: Bachelor of Science in Mathematics
Academic System: Bologna Process (First and Second Years) and Courses System (Third and Fourth Years)
Description Preparation Date: 3/12/2024
File Completion Date: 8/12/2024

Signature:
Head of Department Name:
Prof.Dr. Abdulghafoor Jasim Salim
Date: 5/1/2025

Signature:
Scientific Associate Name:
Prof. Dr. Safwan Omar Hasoon
Date: 5/1/2025

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Lect.Dr. Ibrahim Mohammed Ahmed
Date: 5/1/2025
Signature:

كلية علوم الحاسوب والرياضيات
Quality Assurance
شعبة ضمان الجودة وتقويم الاداء

Approval of the Dean
Signature:
Prof. Dr. Dhuha Basheer Abdullah Al Bazaz
Date: 5/1/2025

كلية علوم الحاسوب والرياضيات
جامعة الموصل
مكتب العميد
DEAN OFFICE
University Of Mosul
College of Computer Science and Mathematic

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

1. Program Vision

The department's goal is to maintain the distinguished scientific reputation derived from the quality of its graduates in terms of knowledge, skills, and abilities in the field of mathematics.

2. Program Mission

The Department of Mathematics should be a leading center in education and scientific research.

3. Program Objectives

1. Continuous aspiration towards excellence in education, scientific research, and professional service in various sciences.
2. Prepare students for the labor market and develop their communication abilities to positively interact with others through active participation in the training program.
3. Acquire skills to demonstrate ideas and encourage teamwork through graduation projects.
4. Prepare students for graduate studies in the field of Mathematics
5. Preparing specialized scientific leaders through graduate programs.
6. Interaction with other sciences.

4. Program Accreditation

N/A

5. Other external influences

The Dean’s Office of the College of Computer Science and Mathematics.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	17	%14.8	There are two academic systems (Bologna Process and Course system)
College Requirements	3	12	%5.6	
Department Requirements	43	169	%79.6	
Summer Training	1	Met or Not Met		
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	**practical**
First	MS 101	Foundations of Mathematics (1)	3	
	MS 102	Calculus (1)	4	
	MS 103	Miscellaneous Mathematical methods	2	
	MS 104	Programming	2	2
	UOM104	Human rights and democracy	2	
	MS 106	General physics	2	
	MS 107	Foundations of Mathematics (2)	3	
	MS 108	Calculus (2)	3	
	MS 109	Linear algebra	2	
	UOM103	Computer	2	2
	MS 110	Principles of Statistics	2	
	UOM102	English language (1)	2	
	UOM101	Arabic language	2	
Second	MS 201	Advanced Calculus (1)		

	MS 202	Ordinary differential equations		
	MS 203	Algebra of groups		
	MS 204	Probability		
	MS 205	Mathematical physics		
	UOM 2022	English language (2)		
	MS 206	Research Methodology		
	MS 207	Advanced Calculus (2)		
	MS 208	Partial differential equations		
	MS 209	Numerical analysis (1)		
	MS 210	Algebra of rings		
	UOM 2012	Arabic language		
	UOM 2032	Computer (2)		
	UOM 2050	The Crimes of the Ba'ath Regime in Iraq		
Third	MS 301	Mathematical analysis (1)	3	
	MS 302	Operations research	3	
	MS 303	Mathematical modeling (1)	3	
	MS 304	English language (3)	2	
	MS 305	Mathematical Statistics (1)	3	
	MS 306	Numerical analysis (2)	2	2
	MS 307	Mathematical Analysis (2)	3	
	MS 308	Number theory	3	
	MS 309	Computational mathematics	2	2
	MS 310	Theory of ordinary differential equations	3	
	MS 311	Mathematical statistics (2)	3	
	MS 312	Fuzzy mathematics	3	
	MS 313	Financial Mathematics	3	
	MS 314	Mathematical modeling (2)	3	
Fourth	MS 401	Complex analysis (1)	3	
	MS 402	Topology (1)	3	
	MS 403	Functional analysis (1)	3	

	MS 404	Graph theory	3	
	MS 405	Dynamic systems	2	
	MS 406	Mathematical Transformations	3	
	MS 407	Complex analysis (2)	3	
	MS 408	Topology (2)	3	
	MS 409	Functional analysis (2)	3	
	MS 410	Research project	2	
	MS 411	English language (5)	2	
	MS 412	Optimization	3	
	MS 413	Cryptography	3	

8. Expected learning outcomes of the program

Knowledge (A)

1. The student should grasp mathematical sciences and use scientific methods in proof and individual analysis as a foundation for research and study.
2. Use analytical and numerical methods to solve any problem and find the optimal solution.
3. Enhance the student's proficiency in both general and specialized fields of mathematics.

Skills (B)

1. Enable the student to develop logical thinking skills.
2. Train the student in analysis and the application of course-related concepts.
3. Enhance the student's cognitive and self-learning abilities within the specialization, as this is a crucial aspect of their field.
4. Equip the student with communication skills and the effective use of modern teaching technologies.

Ethics (C)

1. Theoretical, practical, and applied lecture
2. Computer-assisted teaching and topic presentations using data show
3. Assigning students research projects.

9. Teaching and Learning Strategies

1. Delivering theoretical lectures using PowerPoint and Data Show presentations.
2. Utilizing computer labs for specialized software and applications training.

3. Employing e-learning platforms (such as LMS systems) to facilitate access to educational materials.
4. Promoting teamwork through collaborative assignments and projects.

10. Evaluation methods

1. Daily quizzes
2. Midterm and final examinations
3. Reports and assignments

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Mathematics	Algebra			2	
Professor	Mathematics	Optimization			4	
Professor	Mathematics	Time Series			1	
Professor	Mathematics	Intelligent Techniques			1	
Professor	Mathematics	Graph Theory			1	
Professor	Mathematics	Numerical Analysis			2	
Professor	Mathematics	Differential Equations			2	
Assistant Professor	Mathematics	Differential Equations			2	
Assistant Professor	Mathematics	Algebra			2	

Assistant Professor	Mathematics	Applied Mathematics			2	
Assistant Professor	Mathematics	Fluid Mechanics			1	
Assistant Professor	Mathematics	Numerical Analysis			3	
Assistant Professor	Mathematics	Optimization			1	
Assistant Professor	Mathematics	Topology			1	
Assistant Professor	Mathematics	Numerical and Intelligence Algorithms			1	
Lecturer	Mathematics	Applied Mathematics			4	
Lecturer	Mathematics	Dynamical Systems			1	
Lecturer	Mathematics	Computaional Mathematics			3	
Lecturer	Mathematics	Differential Equations			2	
Lecturer	Mathematics	Algebra			3	
Lecturer	Mathematics	Optimization			3	
Lecturer	Mathematics	Topology			1	
Lecturer	Mathematics	Numerical Analysis			2	
Lecturer	Mathematics	Graph Theory			2	
Lecturer	Computer Science	Digital signal processing			1	
Assistant Lecturer	Computer Science	Communications and networks			1	

Assistant Lecturer	Mathematics	Graph Theory			1	
Assistant Lecturer	Mathematics	Optimization			2	
Assistant Lecturer	Mathematics	Mathematical Statistics			1	
Assistant Lecturer	Mathematics	Algebra			1	
Assistant Lecturer	Mathematics	Computational Mathematics			1	

Professional Development

Mentoring new faculty members

The department is keen to provide a comprehensive professional development program for new faculty members, aiming to enhance their academic and research competencies and facilitate their integration into the university environment. This program includes:

1. Encouraging active participation in teaching and research skills development programs offered by the university, to ensure academic excellence and professional advancement.
2. Organizing specialized workshops and training courses in developing modern teaching methods, assessing student learning, improving learning outcomes, and introducing university systems and e-learning tools.
3. Conducting periodic performance evaluations for faculty members to identify strengths and areas for development.

Professional development of faculty members

The Department of Mathematics seeks to support faculty professional development by encouraging participation in scientific conferences, specialized workshops, and training courses relevant to their disciplines. The department also works to enhance scientific research, develop teaching skills, and adopt the latest educational technologies in the fields of pure and computational mathematics.

12. Acceptance Criterion

The Department of Mathematics adheres to the admission systems approved by the University and the Ministry. Applicants must hold a high school diploma or equivalent, achieving the

required score for the program within the approved capacity. Selection among applicants is based on academic average, while considering student preferences. Final admission is subject to official approval, with the College offering internal transfer opportunities according to specific regulations.

13. The most important sources of information about the program

The College Website:

https://uomosul.edu.iq/computerscience

The Department Website:

https://uomosul.edu.iq/computerscience/%d9%82%d8%b3%d9%85-%d8%a7%d9%84%d8%b1%d9%8a%d8%a7%d8%b6%d9%8a%d8%a7%d8%aa/

14. Program Development Plan

The Mathematics Department implements a development plan aimed at enhancing education quality, elevating graduate competencies, and meeting labor market needs. The "Bologna Process" has been applied as the foundation for program development, including the European Credit Transfer and Accumulation System (ECTS). The system involves improving course structures, regulating learning outcomes, and linking course content to professional competencies. The department periodically reviews the program to ensure alignment with academic quality standards and to measure the impact of updates on student and graduate performance.

Program Skills Outline														
				Required program Learning outcomes										
Year/Level	Course Code	Course Name	Basic or optional	Knowledge			Skills				Ethics			
				A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	
First	MS 101	Foundations of Mathematics (1)	**Basic**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 102	Calculus (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 103	Miscellaneous Mathematical methods	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 104	Programming	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	UOM104	Human rights and democracy	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 106	General physics	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 107	Foundations of Mathematics (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 108	Calculus (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MS 109	Linear algebra	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	UOM103	Computer	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

	MS 110	Principles of Statistics	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM102	English language (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM101	Arabic language	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Second	MS 201	Advanced Calculus (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 202	Ordinary differential equations	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 203	Algebra of groups	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 204	Probability	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 205	Mathematical physics	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM 2022	English language (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 206	Research Methodology	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 207	Advanced Calculus (2)	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	MS 208	Partial differential equations	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 209	Numerical analysis (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 210	Algebra of rings	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM 2012	Arabic language	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM 2032	Computer (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOM 2050	The Crimes of the Ba'ath Regime in Iraq	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Third	MS 301	Mathematical analysis (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 302	Operations research	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 303	Mathematical modeling (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 304	English language (3)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 305	Mathematical Statistics (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	MS 306	Numerical analysis (2)	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 307	Mathematical Analysis (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 308	Number theory	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 309	Computational mathematics	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 310	Theory of ordinary differential equations	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 311	Mathematical statistics (2)	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 312	Fuzzy mathematics	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 313	Financial Mathematics	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 314	Mathematical modeling (2)	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fourth	MS 401	Complex analysis (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 402	Topology (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	MS 403	Functional analysis (1)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 404	Graph theory	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 405	Dynamic systems	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 406	Mathematical Transformations	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 407	Complex analysis (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 408	Topology (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 409	Functional analysis (2)	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 410	Research project	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 411	English language (5)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 412	Optimization	Optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MS 413	Cryptography	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Programming**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 104**				
ECTS Credits	**4.00**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		MS	**College**	CSM	
Module Leader	Shua'a Mahmood Aziz		**e-mail**	shuaamaziz@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Enaam Ghanim Saeed Noor Rafi' Hamza Al-Mutasim Abdul Muhsin		**e-mail**	enaamghanim@uomosul.edu.iq noorrafeh@uomosul.edu.iq almutasim@uomosul.edu.iq	
Peer Reviewer Name		Dr. Omar Saber	**e-mail**	omar.saber@uomosul.edu.iq	
Scientific Committee Approval Date		18/9/2024	**Version Number**		2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Enabling the student to use the basics of programming freely by using programming instructions efficiently 2. Giving the student experience using equations and mathematical functions in the MATLAB program 3. Giving the student experience dealing with matrices using MATLAB and ready-made functions for matrices 4. Enabling the student to write external functions and call them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To have programming experience that may qualify him to use the MATLAB program. 2. To be able to call programming instructions according to his need in the scientific subjects that he will learn in the later stages. 3. He can develop other programs according to the issues that he will review later. 4. To create many programs related to mathematical subjects, especially numerical analysis.
Indicative Contents المحتويات الإرشادية	Chapter 1 Introduction to MATLAB and its features, MATLAB windows and their uses, constants and variables, arithmetic operations, Logical operations, relational operations, precedence of operations and how to benefit from help Input and output instructions. 15 hours Chapter 2 Conditional statements, for loop statement, programs for loop statement, while loop statement, programs for loop statement 15 hours Chapter 3 Matrixes and their types, operations on matrices, ready-made functions for matrices 14 hours Chapter 4 Personal functions, types of personal functions, two-dimensional and three-dimensional drawing 15 hours

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this unit is to encourage students to participate in exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by thinking about the type of simple experiments that include some sampling activities that interest students.

	Knowing the foundations of concepts and where they come from and taking real-life applications of them.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4,2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2,2
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	%10 (20)	5,10	
	Assignments	2	%5(10)	4,8	
	Projects / Lab.	1	%10 (10)		
	Report				
Summative assessment	**Midterm Exam**	1 hour		8	
	Final Exam	3 Hours	%50 (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to MATLAB and its features + MATLAB windows and their uses
Week 2	Constants and variables + Arithmetic operations + Logical operations + Relational operations
Week 3	Operation precedence and how to benefit from help
Week 4	Input and output instructions
Week 5	Conditional statement
Week 6	For rotation statement
Week 7	Programs about rotation statement
Week 8	Mid-course exam
Week 9	While rotation statement

Week 10	Programs about rotation statement
Week 11	Matrices, their types, and ready-made generation instructions
Week 12	Operations on two-dimensional matrices
Week 13	Ready-made functions for matrices
Week 14	Personal functions and two-dimensional graphing
Week 15	Providing a variety of examples for students to practice, in addition to describing the nature of the end-of-course questions
Week 16	End-of-course exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Learn how to call MATLAB and its windows
Week 2	Constants and variables + arithmetic operations + logical operations + relational operations
Week 3	Precedence of execution of operations and how to benefit from help
Week 4	Input and output instructions
Week 5	Executing conditional statement programs if
Week 6	Executing rotation statement programs for for
Week 7	Completing rotation statement programs for for
Week 8	Mid-course exam
Week9	Executing rotation statement programs while
Week10	Completing rotation statement programs for the rotation statement
Week 11	Implementing ready-made instructions to generate various types of matrices
Week 12	Performing operations on two-dimensional matrices
Week 13	Implementing ready-made functions for matrices
Week 14	Implementing personal functions and two-dimensional drawing
Week 15	Implementing various examples as training for students
Week 16	End-of-course exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	"MATLAB Book" by Essam Sarhan Diab 2024	Yes
Recommended Texts	"MATLAB Book for Engineers" by Adnan Shaheen 2024	Yes
Websites	www.mathworks.com	

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.

This year's updates were limited to weeks 11 to 15, where the focus was on implementing specific examples to develop students' skills with the aim of improving the level of the student's scientific output, in line with the requirements of the labor market.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Foundations of Mathematics 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 101**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		MS	**College**		CSM
Module Leader	Raida Dawood Mahmood		**e-mail**		raida.1961@uomosul.edu.iq

Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Maha F. khalaf	**e-mail**	maha.farman@uomosul.edu.iq
Peer Reviewer Name	Dr. Husam Qasem	**e-mail**	husamqm@uomosul.edu.iq
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. The students acquisition of the concept of phrases and mathematical logic. 2. Methods of dealing with these concepts algebraically. 3. Using sets, relations and functions in the third and fourth stage.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Method of proving the properties of union and intersection. 2. Method of proving the properties of relations. 3. Apply mathematic techniques to find equivalence class. 4. Gain in formation about the types of functions and their properties. 5. Method of proving the properties of direct and inverse image.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 The background of set theory, union and intersection of sets, operation on sets [15 hrs] Chapter 2 Difference set, symmetric Difference, power set, Mathematical logic, truth table of sentences. [15 hrs] Chapter 3 Order pair , cartesian product, Relation ,R^{-1} , union and intersections of relation, domain R, Range R.

	[15 hrs] Chapter 4 Reflexive, symmetric, transitive, equivalence relation union and intersection of equivalence relation, equivalence classes. [15 hrs] Chapter 5 Functions, surjective, injective, bijective ,The sum , difference , product, and the quotient functions composition of function, invertible function, direct image, inverse image. [15 hrs]

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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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**	2	20% (20)	5, 10	LO #1, 2, 3
	Assignments	4	14% (14)	2,7,12	LO # 1-4
	Projects / Lab.				
	Report	1	6%(6)	12	LO # 5
Summative	**Midterm Exam**	1 hr	10% (10)	8	LO # 1-3

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	The background of set theory, operations on sets.
Week 2	Symmetric Difference, power set.
Week 3	Mathematical logic.
Week 4	Cartesian product, Relations.
Week 5	Composition of relations.
Week 6	Theorems in composition of relations.
Week 7	Union and intersection of relations.
Week 8	Mid-term Exam +Domain R and Range R.
Week 9	Equivalence relation, reflexive, symmetric and transitive.
Week 10	Example of equivalence relation.
Week 11	Equivalence class and example.
Week 12	Functions, Example of functions , Onto, one to one and bijective functions.
Week 13	Sum, difference , product quotient functions.
Week 14	Composition of function, invertible function.
Week 15	Direct image and invers image.
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	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Pinter,C.C. (1971), Set Theory . 2. Adel, N. and Basil,A.,Introduction to the foundations of Mathematics (2000).	Yes
Recommended Texts	Al-Mayahy,N.F.,Foundations of Mathematics, (2019)	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.

Added:

1.The sum and difference functions.

2.The product and quotient functions.

Based on labor market requirements

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Calculus I**	**Module Delivery**

Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 102**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		MS	**College**	CSM	
Module Leader	Mahasin Thabet Younis		**e-mail**	mahasin_thabet@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Saad Fawzi	**e-mail**	saad_alazawi@uomosul.edu.iq	
Scientific Committee Approval Date		18/09/2024	**Version Number**		2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	4. Provide the fundamental base for elementary mathematics. 5. Use mathematical functions like algebraic and transcendental functions and application of derivatives to solve mathematics, engineering and physics problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Basic 2D curves drawing and lines using properties. 7. Apply mathematic techniques to find the limits and continuous. 8. Apply differential calculus and higher order to solve mathematics, engineering and physics problems. 9. Expanding on many of the functions that were taken in the previous stages. 10. Learn about new functions and study their properties.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 Relations and functions, domain and range, operations on functions. Inverse functions, special function and graphs. Graphing linear equations, distance between two points and between point and line. The rate of change functions, increasing and decreasing functions. Slope and Equations for lines, functions and their graph. [18 hrs.] Chapter 2 Limits and continuity, introduction to limit, some properties of limits, limit involving infinity. Formula definition of Limit. The Limits of rational functions. Some important Theorem on limits. Introduction to continuous functions, algebraic operations on continuous functions, properties of continuous functions. [18 hrs.] Chapter 3 Derivative of functions, derivative by using definition. Derivative of corner, Differentiation rules. Second and higher order derivatives. Chain rule, implicit differentiation. [17 hrs.] Chapter 4 Derivative of special functions and some properties of Transcendental functions, such as: Trigonometric functions, Natural logarithm function, Exponential function, Exponential and logarithmic function bases other than e, Hyperbolic functions, Inverse of trigonometric functions, Inverse of hyperbolic functions, L'Hopital's Rules. Expanding the study of functions that depend on more than one variable, such as the functions f(x,y), and studying partial derivatives and how to derive the function with each independent variable separately. [18 hrs.] Chapter 5 Applications of derivatives: Related rates of change. Slopes and tangent lines with derivatives, Extreme values, Maximum and Minimum Theorems, Rolle's Theorem and Mean Value Theorem, Cauchy's Mean Value Theorem, Monotonicity test (Maximum and Minimum regions) Critical points, concavity and inflections points, Asymptotes, A curve sketching, Graphing Rational functions. Engineering applications Physical applications, Arithmetic applications, velocity, acceleration with application. Second-order derivatives: Study of the interactions of partial derivatives and their applications in understanding curves and surfaces. [18 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. And knowing the basis of the concepts and where they came from and taking realistic applications on that.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 10	LO #1-3
	Assignments	4	14% (14)	2,7,12	LO # 1-4
	Projects / Lab.				
	Report	1	6% (6)	10	LO # 4
Summative assessment	**Midterm Exam**	1 hr.	10% (10)	8	LO # 1-3
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Relations and functions, domain and range, operations on functions. Inverse functions,
Week 2	Special function and graphs. Graphing linear equations, distance between two points and between point and line.
Week 3	The rate of change functions, increasing and decreasing functions. Slope and Equations for lines, functions and their graph.
Week 4	Introduction to limit, some properties of limits, limit involving infinity.
Week 5	Formula definition of Limit, The limits of rational functions. Some important Theorem on limits.
Week 6	Introduction to continuous functions, algebraic operations on continuous functions, properties of continuous functions.
Week 7	**Mid-term Exam +** Derivative of functions, derivative by using definition. Derivative of corner.
Week 8	Differentiation rules. Second and higher order derivatives. Chain rule, implicit differentiation, partial derivative.
Week 9	Derivative of special functions and some properties of Transcendental functions, such as: Trigonometric functions.
Week 10	Natural logarithm function, Exponential function, Exponential and logarithmic function bases other than e.

Week 11	Hyperbolic functions, Inverse of trigonometric functions, Inverse of hyperbolic functions, L'Hopital's Rules.
Week 12	Applications of derivatives: Related rates of change. Slopes and tangent lines with derivatives.
Week 13	Extreme values, Maximum and Minimum Theorems, Rolle's Theorem and Mean Value Theorem, Cauchy's Mean Value Theorem.
Week 14	Monotonicity test (Maximum and Minimum regions) Critical points, concavity and inflections points, Asymptotes, A curve sketching, Graphing Rational functions.
Week 15	Engineering applications, Physical applications, Arithmetic applications, velocity, and acceleration with application.
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	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	THOMAS' CALCULUS, 4th edition , 2018 BY: GEORGE B. THOMAS, JR., JOEL HASS, CHRISTOPHER HEIL and MAURICE D. WEIR	Yes
Recommended Texts	CALCULUS, 9th edition , 2020 BY: JAMES STEWART, DANIEL CLEGG and SALEEM WATSON.	Yes
Websites		

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A** - Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**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.

MODULE DESCRIPTION FORM

The following updates have been added to the semester based on labor market requirements:

1- . Expanding the study of functions that depend on more than one variable, such as the functions f(x,y), and studying partial derivatives and how to derive the function with each independent variable separately.

2- Second-order derivatives: Study of the interactions of partial derivatives and their applications in understanding curves and surfaces.

Module Type	**Basic**	☒**Theory** ☐ **Lecture** ☐ **Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**
Module Code	**UOM104**	
ECTS Credits	**2**	
SWL (hr/sem)	**50**	

Module Level	UGI	**Semester of Delivery**	1
Administering Department	MS	**College**	CSM
Module Leader	Idrees Hadher Heeshan	**e-mail**	idreeshather@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Omar Saber	**e-mail**	omar.saber@uomosul.edu.iq
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
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 teaching of the subject of democracy and human rights aims to teach first-year university students the true meaning of democracy. Teaching students some vocabulary, such as direct democracy, semi-direct democracy, and parliamentary democracy. 2- As for the rights and freedoms that are an integral part of this subject, they give the student an awareness that human rights are not his today, but rather they have been since ancient times and throughout the stages of history in all civilizations and heavenly religions, so that man lives freely without interference from others or being a slave to anyone, and international laws and agreements have emphasized this.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	ب Important: Write at least 6 learning outcomes, preferably equal to the number of weeks of study. 1. Learn how to understand and realize that countries can only be built by applying true democracy and granting people their rights stipulated in the constitution and that the law is above all and there is no difference between all classes of people
Indicative Contents المحتويات الإرشادية	1- Roots of the introductory chapter Definition of democracy, its pillars and goals Introduction Roots of democracy First requirement Definition of democracy Section two: Goals of democracy and its evaluation: First requirement: Goals of democracy Chapter one Forms of democracy

	Section one: Direct democracy Section two: Semi-direct democracy Section three: Representative democracy (parliamentary) Section four: Parliament First requirement: The concept of the representative system and its legal nature First: The concept of the representative system (parliamentary) Section two: Pillars of the representative system The system is characterized by its establishment on four pillars: 1- Parliament elected by the people 2- Timing the term of parliament's mandate 3- A member of parliament represents the entire nation 4- Independence of parliament during its mandate from the electorate Third requirement: Forms of the representative (parliamentary) system 1 0The council system 2 0The presidential system 3 0The parliamentary system 2- Chapter two: The mechanism of the representative system (Parliamentary): Election The first topic: The concept of election and its legal classification The first requirement: The concept of election The second requirement: The legal classification of election The second topic: The electoral body The first requirement: The concept of the electoral body The second requirement: The composition of the electoral body The third requirement: Women and election 3- Chapter Three: Human rights The first requirement: Human rights and public freedoms The first section: Right and freedom in language and terminology The second section: Characteristics of human rights The third section: Types of human rights The second requirement: The historical development of human rights The first section: Human rights in ancient civilizations The second section: Human rights in heavenly religions

	The third section: Human rights in the modern era

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this unit is to encourage students' participation in the exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by considering the types of simple experiments that include some sampling activities that interest students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #4
	Assignments	2	10% (10)	2 and 12	LO #3, #5 and #6, #7
	Onsite Assignments	1	10% (10)	12	LO #8, #9 and #10
	Report	1	10% (10)	13	LO #10, #11 and #12
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Roots of Democracy, Definition of Democracy: A. Definition of Democracy in Language B. Definition of Democracy in Terminology Democracy and Freedom, Pillars of Democracy, Goals of Democracy, Evaluation of

	Democracy
Week 2	Forms of democracy, direct democracy, assessment of the system of direct democracy, semi-direct democracy
Week 3	People's participation in legislative work: 1- Popular objection 2- Popular proposal 3- Popular referendum Popular oversight of people's representatives: 1- Popular dismissal of a representative 2- Popular dissolution of parliament
Week 4	Representative democracy (Nianism): The concept of the representative (parliamentary) system The legal nature of representative democracy: A- The theory of representation B- The theory of the member
Week 5	The pillars of democracy: A- Parliament elected by the people B- Securing the term of Parliament C- A member of Parliament represents the entire nation D- Exploiting Parliament during its term of office on behalf of the electorate
Week 6	Forms of representative (parliamentary) system: council system, presidential system, parliamentary system Parliamentary Council: unicameral system, bicameral system
Week 7	concept of election and its legal adaptation: Election is a personal right, election is a function, election is a legal authority
Week 8	Electoral Body: Restricted Suffrage, Universal Suffrage, Women and Election Electoral lists First requirement: Direct and indirect elections Second requirement: Election: Individual and list elections Third requirement: Majority system and proportional representation system Fourth requirement: Optional voting system and compulsory voting Fifth requirement: Secret voting system and public voting
Week 9	Human rights: human rights and public freedoms, rights and freedoms in language and terminology, characteristics of human rights, types of human rights،
Week 10	Historical development of human rights: human rights in the civilization of Mesopotamia, human rights in the civilization of the Nile Valley, human rights in Greek civilization, human rights in Roman civilization
Week 11	Human rights in Islamic law, human rights in the modern era, governmental human rights organizations, the League of Nations, the United Nations General Assembly،.
Week 12	Human rights NGOs: International Committee of the Red Cross, Amnesty International, Human Rights ، Watch
Week 13	الو Arab Organization for Human Rights, Human Rights and Public Freedoms in National Legislation
Week 14	Iraqi Constitution of 1925 Basic Law, Iraqi Constitution of 1958, Permanent Iraqi Constitution of 200
Week 15	Human rights guarantees at the domestic level: constitutional guarantees, judicial guarantees, political guarantees ،
Week 16	

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		No
Recommended Texts	Democracy and Human Rights Binder	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.

The following updates have been added to the semester according to the requirements of the role of electoral lists play an .important role in all parliamentary elections and provincial councils according to the voting system in effect in the world
Electoral lists
First requirement: Direct and indirect elections
Second requirement: Election: Individual and list elections
Third requirement: Majority system and proportional representation system
Fourth requirement: Optional voting system and compulsory voting

Fifth requirement: Secret voting system and public voting

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Miscellaneous mathematical methods**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 103**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		MS	**College**	CSM	
Module Leader	Hisham Mohammed Khudur		**e-mail**	hisham892020@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Abdulghafoor Jasim	**e-mail**	Drabdul_salim@uomosul.edu.iq	
Scientific Committee Approval Date		18/09/2024	**Version Number**		2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1.Solving systems of linear equations 2. Giving the student experience in dealing with matrices of all types and performing various operations on them. 3. How to find determinates and their related properties 4.How to solve a system of linear equations using the Gauess- Jordan elimination method and gramers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 - Understanding and applying a variety of mathematical methods: Students learn a variety of different mathematical methods and techniques that can be used to solve complex mathematical problems. 2- Developing critical thinking skills: Analysis, synthesis, and critical thinking skills are enhanced when students learn a variety of mathematical methods. Students are encouraged to think systematically and analyze mathematical problems in depth. 3- Ability to solve complex mathematical problems: Students learn how to analyze and understand complex mathematical problems and apply appropriate mathematical methods and techniques to solve them correctly. 4- Creative thinking and innovation: Learning a variety of mathematical methods encourages students to think creatively and innovate in the field of solving mathematical problems. Students learn how to develop new and unique solutions using mathematical methods.
Indicative Contents المحتويات الإرشادية	The guiding content includes the following: 1- Methods for solving a system of linear equations (15 hours) 2- Algebraic operations on matrices (15 hours) 3- Special matrices and examples of them (15 hours) 4- How to find determinants (15 hours) 5- Methods for solving linear equations using Gauss-Jordan elimination (15 hours) and using Cramer's rule.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this unit is to encourage students' participation in the exercises, while at the same time improving and expanding critical thinking skills. This will be achieved through classroom, interactive lessons, and by considering some kind of simple experiments that involve some interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب			
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	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	130		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (10)	4 , 10 , 14	LO #1 – 4
	Assignments	3	15% (10)	2 , 6 , 12	LO # 1 , 2 , 3
	Projects / Lab.	0	0	Continuous	
	Report	1	10% (10)	13	LO # 1 , 2
Summative assessment	**Midterm Exam**	2 hr	10% (10)	11	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Linear Equations System
Week 2	Matrixes
Week 3	Algebraic Operations on Matrices
Week 4	Daily Exam
Week 5	Matrix Rotation
Week 6	Primary Linear Operations
Week 7	Matrix Inverse
Week 8	Gauss-Jordan Elimination Method
Week 9	Determinants
Week 10	Daily Exam
Week 11	First Mid-Course Exam
Week 12	Complementary Factor Method
Week 13	Solving linear equations using Cramer's rule
Week 14	Complex numbers, geometric representation of complex numbers, solving problems

Week 15	Solving various examples of linear equations
Week 16	First course 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	1. Mathematical Methods, Riyad Shaker Naoum and others, First Edition 1985, University of Basra/Iraq 2. Introduction to Linear Algebra with Applications, Bernard Coleman, translated by Adel Ghassan Naoum and Basil Atta Al-Hashemi, first edition 1990, University of Baghdad / Iraq 3. 1. Linear Algebra, George Daif Al-Sabti, University of Basra - Iraq 1988 **4.** Topics in General Mathematics Dr. Hussein Ali Hussein Al-Bokarda 2022-2024	Yes
Recommended Texts		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.

MODULE DESCRIPTION FORM

Update
Complex numbers,
geometric representation of complex numbers,
solving problems (week 14)

Module Title	**General Physics**	**Module Delivery**	
Module Type	**Support**	☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MS 106**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	UGI	**Semester of Delivery**	1
Administering Department	MS	**College**	CSM
Module Leader	Kheder Ali Salah	**e-mail**	khederali@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Saad Fawzi	**e-mail**	saad_alazawi@uomosul.edu.iq

Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Introduce students to the importance of general principles in physics by explaining (The SI Units, Quantities, Displacement, Distance, Scalar & Vector Quantities, Motion, Velocity, Speed, Acceleration, Kinematic equations, a Freely Falling Body, Projectile Motion, laws of Newton's of motion, and Friction, nature of light, physical optics, reflection and refraction). 2- Enabling students to distinguish between Vectors quantities and Scalar quantities and the motion of the body at constant Velocity and constant Acceleration with Kinematic equations, Freely falling body, Projectile Motion, Newton's Laws of Motion, and Friction and light laws. 3- Develop students' knowledge about the most important mechanics in (Scalar & Vector quantities, Displacement, Distance, Velocity, Acceleration, Kinematic equation, the Freely Falling body, Projectile motion, Newton's Laws of Motion, and Friction). 4- Accustom students to linking the theoretical side of the module with the daily practical life of the student, by giving him examples related to ordinary life. 5- Study the (Scalar quantities & Vector quantities) properties by studying the sum, subtract, Scalar product & Vector product. 6- Study the Displacement, and (Motion of the body) at constant Velocity & acceleration, and the Kinematic equations. 7-Enabling the student to know the basic concepts of a Freely Falling body, Projectile Motion, Newton's Laws of Motion, and Friction. 8- Overall, the aim of a module is to provide students with powerful tools for understanding and analyzing Classical Mechanics properties.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Properties of Mechanics: Mechanics are classified into Two important essential branches which are namely kinematics and Dynamics. 2- Kinematic: This is the branch of mechanics that studies the motion of a body without regard to the cause of that motion. which include the study of average velocity and a constant velocity of a moving body, average acceleration and constant acceleration of a moving body, Instantaneous velocity, and instantaneous acceleration of a moving body. 3- The Three Kinematic equations of motion which describe the motion of body with initial velocity and final velocity, instant of time (t), displacement, and acceleration of a moving body. 4- The Freely Falling Body: which describe the body that is moving freely under the

	influence of gravity, where it is assumed that the effect of air is negligible. 5- Projectile Motion: which describe of an object is simple to analyze if we make two assumption: (1) the free-fall acceleration is constant over the range of motion and is directed downward, and (2) the effect of air resistance is negligible, and study Horizontal Range, Maximum Height of Projectile and time of flight of the projectile. 6- Dynamic: is the branch of mechanics concerned with the forces that change or produce the motion of bodies. the foundation of dynamics is Newton's Laws of motion (First, Second and Third Law). Another type of Dynamic is the Friction which is divided in two type the first is (Force of Static Friction) and the second is the (Force of Kinetic Friction). 7- Introduction to properties of light. 8- Types of reflection: External reflection: This happens when it is (n>1), that is, when the light falls from the medium of the lowest light density to the medium of the highest light density (for example, "when light falls from the air towards the water). Internal reflection: This happens when it is (n<1), that is, when light falls from the medium with the highest light density to the medium with the lowest light density (from glass to the air).
Indicative Contents المحتويات الإرشادية	This course introduces the use of Chemical, physical methods in the study of biological systems: Scope of Biophysics, Fundamentals of Biophysics, interaction of light With matter, ChemicalForces, Diffusion and Brownian motion, Viscosity, Light Scattering Small - Molecule Solutes:hydrophiles, hydrophobes, large Hydrophobic Solutes and Surfacec, Aqueous Environment of theCell, State of Water in bio-structures & its significance, phsico Chemical Techniques to StudyBiophsics (Introduction, Physical Aspects, of Hearing) (The Ear, Elementary acoustics, Theories ofhearing), Optical defects of the eye, Neural aspects of Vision, Chemical equilibriums in biologicalsystems, Bioenergy

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Conceptual Understanding: Start by providing an overview of nature of the light, and Help students understand how this principles and methods are used to analyze and interpret data in these areas. Use real-world examples and case studies to illustrate the significance of optics techniques. Problem-Solving Practice: Include problem-solving activities and assignments that require students to apply this theory to practical scenarios. Present them with real or simulated data and challenge them to analyze and interpret the information using appropriate optics techniques. This will develop their problem-solving skills and reinforce their understanding of the subject matter. Supplemental Resources: Recommend supplementary resources such as textbooks, research articles. Encourage students to explore these resources to gain a deeper understanding of the subject matter. Provide a curated list of recommended readings and online tools to support their learning. Assessment and Feedback: Regularly assess students' understanding through quizzes, tests, or projects. Provide constructive feedback to guide their learning and address any misconceptions. Consider incorporating formative assessments to gauge understanding before major evaluations, allowing for timely intervention and support. Collaboration and Discussion: Foster collaboration among students by organizing group discussions, case studies, or problem-solving sessions. Encourage them to share their perspectives, ideas, and experiences related to nature of the light. This collaborative

	environment promotes active learning, critical thinking, and knowledge sharing.

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	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	3	10% (10)	4, 10 and 15	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الأسبوعي النظري

	Material Covered
Week 1	Scope of Biophysics, Fundamentals of Biophysics.
Week 2	Interaction of light With matter.
Week 3	Chemical Forces.
Week 4	Discussion and Quiz
Week 5	Diffusion and Brownian motion, Viscosity.
Week 6	Light Scattering Small - Molecule Solutes:hydrophiles, hydrophobes, large Hydrophobic Solutes and Surfacec.
Week 7	Aqueous Environment of theCell, State of Water in bio-structures & its significance.
Week 8	phsico Chemical Techniques to StudyBiophsics (Introduction, Physical Aspects, of Hearing).
Week 9	The Ear, Elementary acoustics, Theories ofhearing.
Week 10	Discussion and Quiz
Week 11	Optical defects of the eye.
Week 12	Neural aspects of Vision.

Week 13	Chemical equilibriums in biological systems.
Week 14	Bioenergy.
Week 15	Discussion and Quiz

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	The acceleration of free fall by means of the simple pendulum.
Week 2	The velocity of sound.
Week 3	Ohms law.
Week 4	The focal length of mirrors.
Week 5	The refraction of light.
Week 6	The focal length of lenses.
Week 7	The coefficient of 1)static and 2)dynamic friction for wood on wood.
Week 8	The specific weight of solid body and liquid
Week 9	Determined the frequency of a tuning fork by means of a sonometer
Week10	Quiz
Week 11	
Week 12	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Physics for Scientists and Engineers with modern physics/ Douglas C. Giancoli (2009). 2. Physics for Scientists and Engineers with modern physics/ Raymond A. Serway and John W. Jewett, Jr. (2016). 3. Physics part 1/ Jearl Walker. (2010). 4. Practical physics in (SI) BY E.Armitage.	
Recommended Texts	1. **fundamentals of Physics, 8th edition, by** Jearl Walker . 2. Fundamentals of College Physics Updated Fifth Edition Volume I: Mechanics, Vibratory Motion,	

	Wave Motion, Fluids, and Thermodynamics Dr. Peter J. Nolan. 3. College physics by serway.	
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.

The curriculum has been updated by 10%, with new intermediate topics added to keep pace with scientific developments in general physics and to meet the work requirements of graduates. Optics, the laws of motion, light, sound, and electronics have all been updated.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Foundations of Mathematics 2**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical**
Module Code	**MS 107**	
ECTS Credits	**6**	
SWL (hr/sem)	**150**	

		☐ **Seminar**	
Module Level	UGI	**Semester of Delivery**	2
Administering Department	MS	**College**	CSM
Module Leader	Zubaida M. Ibrahim	**e-mail**	z.mohammed@uomosul.edu.iq
Module Leader's Acad. Title	Ass.Professor	**Module Leader's Qualification**	M.SC.
Module Tutor	Maha F. khalaf	**e-mail**	maha.farman@uomosul.edu.iq
Peer Reviewer Name	Dr. Husam Qasem	**e-mail**	husamqm@uomosul.edu.iq
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	6. The students acquisition of the concept of equivalence and the cardinal number. 7. The students learns how the natural numbers , integer numbers and rational numbers was created. 8. Identify the hypotheses of real numbers and create complex numbers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Calculate the cardinal number of any finite and infinite set. 12. Find the cardinal number of power set. 13. Using mathematical induction to prove the properties of natural numbers. 14. Find the retationship between the numbers N,Z,Q,IR, and ℂ 15. Understanding the concept of algebraic structure , especially groups
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 The background of equivalent set , Cardinal number , example, cantors Theorem , Card(N) , Card(Z), Card(Q), Card(IR) [15 hrs]

	Chapter 2 Peano axioms, Mathematical induction , properties of natural numbers. [15 hrs] Chapter 3 The set of integer numbers , its properties , its relationship with the natural numbers, prime numbers rational numbersv, Divisibility,Division algorithm [15 hrs] Chapter 4 The set of complex numbers, conjugat number, polar represention De Moiver Theorem, the fundamental theorem of Algebra [15 hrs] Chapter 5 Concept of algebraic structure, binary operation, associative, commutative, group, infinite algebraic structure, Z_n [15 hrs]

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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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	2	20% (20)	5, 10	LO #1, 2, 3
	Assignments	4	14% (14)	2,7,12	LO # 1-4
	Projects / Lab.				
	Report	1	6%(6)	10	LO # 4
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	The background of equivalent sets.
Week 2	Cardinal number and example.
Week 3	Infinite sets and countable sets.
Week 4	Calculating cardinal number, and adding cardinal number.
Week 5	Cantors Theorem.
Week 6	Peano axioms , Mathematical induction.
Week 7	Arithmetic of natural numbers.
Week 8	Mid-term Exam +The set of integer numbers Z
Week 9	The properties of integer numbers , prime numbers and their distribution
Week 10	The set of rational numbers (Q) , and their properties
Week 11	Divisibility , Division algorithm
Week 12	Real numbers (IR) ,Complex numbers ($\mathbb{C}$) , the geometrical representation for the $\mathbb{C}$.
Week 13	Conjugat number , polar represention .
Week 14	De Moivres Theorem , The fundamental theorem of Algebra.
Week 15	The background of group theory , definition and examples.
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	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	3. Pinter, C.C. (1971) , Set Theory. 4. Adel, N. and Basil,A.,Introduction to the foundations of Mathematics (2000)	Yes
Recommended Texts	Al-Mayahy,N.F.,Foundations of Mathematics, (2019)	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
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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

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Added:

1. prim numbers and their distribution.

2.Divisibility.

Based on labor market requirements.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**English 1**			**Module Delivery**	
Module Type	**Support**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**UOM102**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		MS	**College**	CSM	
Module Leader	Zahraa Ahmed Othman		**e-mail**	zahraa.alpachachi@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Master
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Bassim Abbas	**e-mail**	basimah@uomosul.edu.iq	
Scientific Committee Approval Date		18/09/2024	**Version Number**		2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Language Proficiency: Develop basic language proficiency in English, including listening, speaking, reading, and writing skills. 2. Grammar: Understand and apply basic grammatical structures, including parts of speech, sentence formation, verb tenses, subject-verb agreement, and basic sentence patterns. 3. Vocabulary Building: Expand vocabulary through learning and practicing common words, synonyms, antonyms, idioms, phrasal verbs, and collocations. 4. Reading Comprehension: Improve reading skills by understanding main ideas, supporting details, making inferences, and analyzing texts of

	varying complexity. 5. Listening Comprehension: Enhance listening skills by understanding spoken English, including conversations, lectures, and presentations, and extracting key information. 6. Speaking Skills: Develop oral communication skills through practicing pronunciation, participating in conversations, giving presentations, and expressing opinions. 7. Writing Skills: Enhance writing abilities by practicing sentence construction, paragraph development, descriptive writing, narrative writing, and basic essay structure. 8. Cultural Awareness: Gain cultural understanding and appreciation through exposure to English-language literature, media, and diverse perspectives. 9. Study Skills: Develop effective study strategies, note-taking techniques, and time management skills for English language learning. 10. Assessment: Demonstrate language proficiency through quizzes, tests, presentations, writing assignments, and class participation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the English 1 course for the mathematics department, students should be able to demonstrate the following learning outcomes: 1. Demonstrate basic proficiency in listening, speaking, reading, and writing skills in English. 2. Apply grammatical structures accurately to communicate effectively in written and spoken English. 3. Expand their vocabulary and use appropriate words and phrases in various contexts. 4. Comprehend and analyze written texts of different genres, including articles, short stories, and essays. 5. Understand spoken English in various situations, such as conversations, lectures, and presentations. 6. Engage in effective verbal communication, express opinions, and participate in discussions. 7. Write clear and coherent sentences, paragraphs, and short essays using proper organization and language conventions. 8. Develop cultural awareness and sensitivity to different cultural perspectives reflected in English literature and media. 9. Apply effective study skills, including note-taking, time management, and self-assessment techniques. 10. Demonstrate language proficiency through assessments, including quizzes, exams, presentations, and writing assignments.
Indicative Contents المحتويات الإرشادية	The indicative contents for the English 1 course may include the following topics: 1. Introduction to English Language: o Basic grammar rules and sentence structure o Parts of speech: nouns, verbs, adjectives, adverbs, etc. o Simple sentence construction and punctuation

	2. Vocabulary Building: ○ Commonly used words and expressions ○ Word formation: prefixes, suffixes, and root words ○ Synonyms, antonyms, and idiomatic expressions 3. Reading Comprehension: ○ Developing reading skills through texts of varying difficulty ○ Understanding main ideas, supporting details, and inference ○ Practicing skimming and scanning techniques 4. Writing Skills: ○ Paragraph writing: topic sentences, supporting details, and concluding sentences ○ Sentence structure and paragraph coherence ○ Developing basic writing skills: descriptive, narrative, and expository writing 5. Listening Skills: ○ Listening to and understanding spoken English in different contexts ○ Note-taking and summarizing information from spoken sources ○ Developing listening comprehension through audio materials and dialogues 6. Speaking Skills: ○ Basic conversation skills: greetings, introductions, and simple dialogues ○ Pronunciation and intonation practice ○ Participating in group discussions and oral presentations 7. Cultural Awareness: ○ Exploring English-speaking countries and their cultures ○ Understanding cultural differences and norms in communication 8. Language Practice and Activities: ○ Role plays, pair work, and group activities to practice language skills ○ Language games, quizzes, and interactive exercises for reinforcement These indicative contents provide a general overview of the topics and skills covered in the English 1 course, focusing on developing foundational language skills in reading, writing, listening, and speaking.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the English 1 course aim to create an engaging and interactive learning environment where students can actively participate and develop their language skills. Some effective strategies include: 1. Communicative Approach: Emphasizing the use of English for

	meaningful communication, allowing students to practice and apply language skills in real-life situations through role plays, pair work, and group activities. 2. Task-based Learning: Providing students with practical tasks and projects that require them to use English to achieve specific goals, fostering critical thinking, problem-solving, and collaboration skills. 3. Multi-modal Learning: Integrating various learning resources such as textbooks, audio recordings, videos, and online materials to cater to different learning styles and enhance comprehension and language acquisition. 4. Scaffolded Instruction: Breaking down complex language concepts into manageable steps, providing clear instructions, and gradually increasing the level of difficulty to ensure students' understanding and progress. 5. Formative Assessment: Implementing regular quizzes, assignments, and in-class activities to gauge students' understanding and provide timely feedback for improvement. 6. Technology Integration: Utilizing digital tools and resources, such as language learning apps, online dictionaries, and multimedia platforms, to enhance language practice, vocabulary acquisition, and listening comprehension. 7. Authentic Materials: Exposing students to authentic English materials, such as news articles, short stories, and videos, to develop their reading and listening skills and expose them to real-world language use. 8. Error Correction and Feedback: Providing constructive feedback and error correction to guide students in improving their language accuracy and fluency, both in written and spoken English. 9. Cultural Immersion: Incorporating cultural activities, discussions, and projects to promote intercultural understanding and awareness of different English-speaking cultures. By employing these strategies, the English 1 course aims to create an engaging and effective learning environment that fosters students' language proficiency, confidence, and communication skills in English.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	. Introductory lecture
Week 2	. Translation of a passage about mathematics
Week 3	Explanation of the topic of simple past rules and completion of the previous passage.
Week 4	. Explanation of the topic of simple present and opposites of adjectives
Week 5	. Translation of the passage benefits of mathematics
Week 6	. Ten-mark exam on grammar
Week 7	Discussing passage about the importance of mathematics.
Week 8	. Translation of the passage about nature and cooperation
Week 9	Completion of the previous passages.
Week 10	Mid exam
Week 11	Explanation of a passage about mathematics.
Week 12	. Completion of the previous subject.
Week 13	. Review of the topic of English grammar
Week 14	Explanation of the whole passages.
Week 15	End of the course
Week 16	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	English Grammar In Use.By Raymond Murhpy.	
Recommended Texts	English For Information Technology. By David Bonamy.	
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.

The Following Update Has Been added according to the requirements of the labor market

1-we have added the English passages related to mathematics science

2-teaching the students some of important English grammar rules

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Arabic Language 1**	**Module Delivery**	
Module Type	**Support**	☒**Theory** ☒**Lecture** ☐ **Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**UOM101**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	UGI	**Semester of Delivery**	2

Administering Department	MS	**College**	CSM
Module Leader	Marwa Adnan Ismael	**e-mail**	Marwa-Adnan@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Abdulghafor Jasim	**e-mail**	drabdul_salim@uomosu.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1- Getting to know Arabic speech: in terms of its definition, divisions, and signs for each section. 2- Knowing the Arabic sentence and the divisions of the Arabic sentence, nominal sentences and verbal sentences 3- Getting to know the movements of inflection: whether original or subsidiary 4- The student's knowledge of the Arabic verb: in terms of soundness and defect 5- The student's knowledge of the Arabic verb in terms of necessity and transitivity 6- The student's knowledge of the Arabic verb in terms of tense 7- Ways of writing the number, its masculinity and feminization 8- Knowing the punctuation marks in speech 9- Learning the rules of drawing the hamza 10- Learning how to write the tied and extended taa 11- Say and do not say: common mistakes among speakers and writers 12- Knowing what the declarative style is, 13- Knowing what the constructive style is, 14-Learning linguistic skills: Developing linguistic taste and improving the style of learners
Module Learning Outcomes	1- The student should know the Arabic language: in terms of its definition, divisions, and signs for each section. 2- The student should learn the Arabic sentence and the divisions of the Arabic

	sentence, nominal sentences and verbal sentences 3- Identify the movements of inflection: whether original or subsidiary 4- The student should know the Arabic verb: in terms of soundness and defect 5- The student should learn the Arabic verb in terms of necessity and transitivity 6- The student should know the Arabic verb in terms of tense 7- The student should know the ways of writing the number, its masculine and feminine forms 8- The student should know the punctuation marks in speech 9- The student should learn the rules of drawing the hamza 10- The student should know the way of writing the tied and extended taa 11- Say and do not say: common mistakes among speakers and writers 12- Identify the declarative style, 13- Know what the constructive style is, 14-Learn linguistic skills: Develop linguistic taste, and improve the style of learners
Indicative Contents	1- Getting to know Arabic speech: in terms of its definition, divisions, and signs for each section] Hour 2[2- Getting to know the Arabic sentence and the divisions of the Arabic sentence, nominal sentences and verbal sentences, Hour 2 3- Getting to know the movements of inflection: whether original or subsidiary, Hour 2 4- The student's knowledge of the Arabic verb: in terms of soundness and defect, Hour 2 5- The student's knowledge of the Arabic verb in terms of necessity and transitivity, Hour 2 6- The student's knowledge of the Arabic verb in terms of tense, Hour 2 7- Methods of writing the number, its masculinity and feminization, Hour 2 8- Getting to know the punctuation marks in speech, Hour 2 9- Learning the rules of drawing the hamza, Hour 2 10- Getting to know the method of writing the tied and extended taa, Hour 2 11- Say and do not say: Common mistakes made by speakers and writers, Hour 2 12- Knowing what the news style is, Hour 2 13- Knowing what the construction style is, 2 hours 14-Learning linguistic skills: Developing linguistic taste and improving style among learners, 2 hours

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this unit is to encourage students to engage in speaking and writing Arabic correctly, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by considering types of simple experiments that include some sampling activities that interest students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Arabic speech: definition, divisions, and signs of each division.
Week 2	Arabic sentence: definition, divisions: nominal and verbal
Week 3	I'rab movements: original, subsidiary
Week 4	The Arabic verb: in terms of soundness, defectiveness, transitivity and intransitivity
Week 5	Kan and its sisters
Week 6	In and its sisters
Week 7	Exam
Week 8	Number: reminder, and its feminization
Week 9	Punctuation marks in speech
Week 10	Rules for drawing the Hamza

Week 11	Ta marbuta, and the extended ta
Week 12	Say and do not say: common mistakes among speakers and writers
Week 13	Informative style, and the constructive style
Week 14	Informative style, and the constructive style
Week 15	**Linguistic skills: developing linguistic taste, and improving style among learners**
Week 16	**End of semester exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:
Week 2	Lab 2
Week 3	Lab 3
Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Collector of Arabic Lessons: Sheikh Mustafa Al-Ghalayini	no
Recommended Texts	The Arabic Sentence: Its Composition and Sections Dr. Fadhel Al-Samarrai	No
Websites	https://www.almrsal.com/post/923401	

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.

The curriculum has been updated in accordance with the requirements of the labor market, where two topics have been added to the curriculum: the verbs that change the beginning, “kana” and its sisters, and “in” and its sisters. This is due to their importance to the student, as they help him to know the changes that occur to the subject and predicate when entering them.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Calculus II**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 108**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		
Module Level	UGI	**Semester of Delivery**	2
Administering Department	MS	**College**	CSM
Module Leader	Ahmed Farooq Qasim	**e-mail**	ahmednmerical@uomosul.edu.iq
Module Leader’s Acad. Title	Assistant Professor	**Module Leader’s Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ekhlass Saadallah	**e-mail**	drekhlass-alrawi@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	9. Provide the fundamental base for elementary types of coordinates and applications. 10. Integrations of algebraic functions, transcendental functions and application of integrations to solve mathematics, engineering and physics problems. 11. Learn the sequences and series and convergence and divergence methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. Elementary types of coordinates and applications 17. Learn techniques integration. 18. Applications of integrations to solve mathematics, engineering and physics problems. 19. Expanding on many of the functions that were taken in the previous stages. 20. Learn the sequences and series and convergence and divergence methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 Integration: Introduction of Integrations, Types of integrations, Integrations of special functions, such as: Algebraic functions, Trigonometric functions, Natural logarithm function, Exponential function, Exponential and logarithmic function bases other than e, Hyperbolic functions, Inverse of trigonometric functions, Inverse of hyperbolic functions, celling and floor functions. [18 hrs.] Chapter 2 Techniques of integration: Integration using substitution, Integration by parts, Integration of Trigonometric (power, product), Trigonometric substitutions, Rational functions and partial fractions, Rationaling substitutions, Integration of rational function in sine and cosine, Integral by hyperbolic substation, Improper Integral, Comparison test for improper Integrals, King property integration. [18 hrs.] Chapter 3 Applications of integration: Definition of Areas and types of areas, Definition Volumes and types of volumes, length of curves in the plane, Areas of Surfaces of revolution. [17 hrs.] Chapter 4 Review the Cartesian coordinates with two dimensions, Polar Coordinates and types of polar equations, Symmetric of polar, Converting between Cartesian and polar, Tangents to polar curves, Area with polar, Arc length of polar curves, Cartesian coordinates with three dimensions, Representations and decrement octanes, distance formula and section formula in three dimensions, graphs , Applications in three dimensions, introduction of cylindrical and spherical coordinates with converting [18 hrs.] Chapter 5 Introduction about Sequences, formula of sequences, types of sequences, convergent and divergent of sequences, Testing for monotonicity for sequences, Introduction about series and formula of series,

	geometric series, Test convergence and divergence of series, Introduction of polynomials, Approximation using derivatives, Maclaurin polynomial, Taylor polynomial. [18 hrs.]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. And knowing the basis of the concepts and where they came from and taking realistic applications on that.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 10	LO #1-3
	Assignments	4	14% (14)	2,7,12	LO # 1-4
	Projects / Lab.				
	Report	1	6% (6)	10	LO # 4
Summative assessment	**Midterm Exam**	1 hr.	10% (10)	8	LO # 1-3
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Integration: Introduction of Integrations, Types of integrations, Integrations of special functions, such as: Algebraic functions, celling and floor functions.
Week 2	Trigonometric functions, Natural logarithm function, Exponential function, Exponential and logarithmic function bases other than e.
Week 3	Hyperbolic functions, Inverse of trigonometric functions, Inverse of hyperbolic functions.
Week 4	Techniques of integration: Integration using substitution, Integration by parts, Integration of Trigonometric(power, product).
Week 5	Trigonometric substitutions, Rational functions and partial fractions.
Week 6	Rationaling substitutions, Integration of rational function in sine and cosine, Integral by hyperbolic substation.
Week 7	**Mid-term Exam +** Improper Integral, Comparison test for improper Integrals, King property integration.
Week 8	Applications of integration: Definition of Areas and types of areas, Definition Volumes, Types of volumes.
Week 9	Types of volumes, length of curves in the plane, Areas of Surfaces of revolution.
Week 10	Review the Cartesian coordinates with two dimensions, Polar Coordinates and types of polar equations.
Week 11	Symmetric of polar, Converting between Cartesian and polar, Tangents to polar curves, Area with polar, Arc length of polar curves.
Week 12	Cartesian coordinates with three dimensions, Representations and decrement octanes, distance formula and section formula in three dimensions, graphs, Applications in three dimensions, introduction of cylindrical and spherical coordinates with converting.
Week 13	Introduction about Sequences, formula of sequences, types of sequences, convergent and divergent of sequences, Testing for monotonicity for sequences,
Week 14	Introduction about series and formula of series, geometric series, Test convergence and divergence of series.
Week 15	Introduction of polynomials, Approximation using derivatives , Maclaurin polynomial, Taylor polynomial.
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	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	THOMAS' CALCULUS, 4th edition , 2018 BY: GEORGE B. THOMAS, JR., JOEL HASS, CHRISTOPHER	Yes

	HEIL and MAURICE D. WEIR	
Recommended Texts	CALCULUS, 9th edition , 2020 BY: JAMES STEWART, DANIEL CLEGG and SALEEM WATSON.	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	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.

The following updates have been added to the semester based on labor market requirements:
1- Approximation using derivatives , Maclaurin polynomial, Taylor polynomial.

Module Information
معلومات المادة الدراسية

Module Title	**Linear algebra**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 109**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UGI	**Semester of Delivery**	2
Administering Department	MS	**College**	CSM

Module Leader	Hind Husaam Al-Deen Mohammed	**e-mail**	hindmath@uomosul.edu.iq
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Abdulghafor Mohammed Ameen	**e-mail**	abdulghafor_rozbayani@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Identify vector space and related concepts 2. Identify subspace and its algebraic properties 3. Identify linear transformations and their applications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understanding and applying a variety of mathematical methods: Students learn a variety of different mathematical methods and techniques that can be used to solve complex mathematical problems. 2- Developing critical thinking skills: Analysis, synthesis, and critical thinking skills are enhanced when students learn a variety of mathematical methods. Students are encouraged to think systematically and analyze mathematical problems in depth. 3- Ability to solve complex mathematical problems: Students learn how to analyze and understand complex mathematical problems and apply appropriate mathematical methods and techniques to solve them correctly. 4- Creative thinking and innovation: Learning a variety of mathematical methods encourages students to think creatively and innovate in the field of solving mathematical problems. Students learn how to develop new and unique solutions using mathematical methods.

Indicative Contents المحتويات الإرشادية	Indicative Contents Indicative Contents The indicative content includes the following: 1- Vector Space and Subspace (15 hours) 2- Linear Structure (15 hours) 3- Base and Dimension (15 hours) 4- Inner Product Space (15 hours) 5- Linear Transformations (15 hours)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this unit is to encourage students' participation in the exercises, while at the same time improving and expanding critical thinking skills. This will be achieved through classroom, interactive lessons, and by considering some kind of simple experiments that involve some interesting sampling activities for the students.

Student Workload (SWL)
الحمل الدراسي للطالب

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	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	130		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (10)	7 , 12 , 15	LO #1 – 4
	Assignments	3	15% (10)	2 , 6 , 12	LO # 1 , 2 , 3
	Projects / Lab.	0	0	Continuous	
	Report	1	10% (10)	13	LO # 1 , 2
Summative assessment	**Midterm Exam**	2 hr	10% (10)	11	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vector Space and Related Theorems
Week 2	Unit Vector and Length
Week 3	Angle between Two Vectors
Week 4	Subspace and Related Theorems
Week 5	Linear Composition
Week 6	Linear Independence and Linear Composition
Week 7	Daily Exam
Week 8	Base and Dimension
Week 9	Inner Product Space
Week 10	Second Mid-Course Exam
Week 11	Linear Transformations
Week 12	Daily Exam
Week 13	Examples of Linear Transformations
Week 14	Zero Transformation and Self-Transformation
Week 15	Introduction to Euclidean Space, Definitions, Various Examples
Week 16	Second Course 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	1) Stoll .R. R. and Wong .E. T. Linear Algebra, London, 1968. 2) Strang . G., Linear Algebra and Its Application, New York, 2nd ,1980.	Yes

	3) Mostow . G. D. and Sampson. J .H., Linear Algebra, London, 1969. 4) 1) George Daif Al-Sabti, Linear Algebra, University of Basra - Iraq, 1, 1988. 5) 5) Khaled Ahmed Al-Samarrai and Saad Ibrahim Mahdi, Introduction to Linear Algebra, University of Baghdad - Iraq, Parts One and Two, 1989. Yahya Abdul Sattar and Nizar Hamdoun Shukr, Linear Algebra, University of Mosul - Iraq, 1, 1988. **6)** 6) Introduction to Linear Algebra, Riyad Haitham, Al-Mustansiriya University, Iraq, Part Two, 2020	
Recommended Texts		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.

Update
Introduction to Euclidean Space,
Definitions,
Various Examples (week 15)

Module Information
معلومات المادة الدراسية

Module Title	**Computer 1**	**Module Delivery**
Module Type	**Support**	☒ **Theory**

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Code	**UOM103**	☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
ECTS Credits	**3**	
SWL (hr/sem)	**75**	

Module Level	UGI	**Semester of Delivery**	2
Administering Department	MS	**College**	CSM
Module Leader	Shua'a Mahmood Aziz	**e-mail**	shuaamaziz@uomosul.edu.i
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor	Enaam Ghanim Saeed Noor Rafi' Hamza	**e-mail**	enaamghanim@uomosul.edu.iq noorrafeh@uomosul.edu.iq
Peer Reviewer Name	Dr. Ban Ahmad Hassan	**e-mail**	banah.mitras@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Objectives أهداف المادة الدراسية	1. Improved Communication: Faster communication can help increas productivity, allow for better business decisions and facilitate a company' expansion into new regions or countries. The movement of information withi organizations or businesses has become instantaneous. Employees can easil transfer data across departments without any interruption. Tools such as emai e-fax, mobile phones and text messaging improve the movement o information data between employees, customers, business partners o suppliers, allowing for greater communication across internal and externa structures. 2. Work: Streamlined workflow systems, shared storage and collaborativ workspaces can increase work efficiency and allow employees to process greater level of work in a shorter period of time. IT systems can be used t automate routine tasks, facilitate data analysis and store data in a way that ca be easily retrieved for future use. Technology can also be used to answe customer questions via email, in a real-time chat session, or through a phon routing system that connects the customer to an available customer servic agent. 3. Reduced Costs and Economic Efficiency: Communications and socia technology have made business promotion and product launching accessible t everyone. Many small businesses have found ways to use social technology t increase their brand awareness and get more customers at a lower cost. I business, factors such as operating costs play an important role in busines development and growth. So when businesses use information technology t reduce operating costs, the return on investment will increase, which will lea to business growth.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enhancing the ability of information technology to adapt and respond to the multipl renewable and constantly changing needs of all parties benefiting from the outputs o the information system, especially university leaders in the research university, thu enabling information technology to perform its work efficiently and effectivel Predicting the phenomenon studied in the future. 2. Employing information technology in the axes of the educational process has worke to build a bridge of vital communication between faculty members and all sources o the educational process, which necessarily means facilitating the teacher's task i conveying information to the student within an interactive technical environment, an information technology provides multiple sources in order to obtain informatio whether from sources within the university or from the Internet and what it contains o educational technologies.
Indicative Contents المحتويات الإرشادية	Although IT is one of the most in-demand fields in all global markets today, som specializations range between stagnant, saturated and in demand, so you should study th market well before choosing a specialization. If you are looking for the best specializations that have a future in the field of informatio technology, they are as follows: Network Security Specialization in Programming - Software Engineering - 3D Printing - Da Science Specialization - Artificial Intelligence - Computer Science - Aerospace Engineering

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this unit is to encourage student

	participation in the exercises, while at the same time improving and expanding their critica thinking skills. This will be achieved through interactive classrooms and educational program using appropriate teaching strategies, methods and educational aids to develop thinking skills.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	3hr	10% (10)	7	LO #1 - #7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Giving an overview of the programs Word, Excel and PowerPoint and the benefits of each of them, their uses and weaknesses.
Week 2	Getting to know the Word program - How to open or run the program - Converting the Word program interfac - Word program menus.
Week 3	Explanations about the main toolbar and menus in general
Week 4	Writing documents, determining the font size, converting between languages, organizing paragraphs and dimensions between them, coloring the writing, searching for words and replacing them
Week 5	Inserting tables, pictures, shapes, text boxes, and controlling them, and inserting page numbering
Week 6	Explanation of how to insert equations with writing them and the details that a mathematics student needs
Week 7	Entering data in Excel - How to navigate in a worksheet - - Shading cells - Clearing cells
Week 8	Midterm exam
Week 9	Using a function from the ready-made functions to a cell with examples and inserting pictures, equations and

	shapes
Week 10	Creating a special function and applying it to different ranges of the worksheet and from the workbook as well
Week 11	Defining the importance of building a POWER POINT presentation - and entering the program and the progra interface - Creating a new presentation
Week 12	Opening a presentation file - Saving a presentation - Inserting a new slide - Adding shapes to the slide - Slide margins - Slide design - Inserting drawings, shapes and equations to the slide and controlling them
Week 13	Controlling time and movements on shapes and slides
Week 14	Explanations about the importance of the Internet and email with examples
Week 15	Sending and receiving a message, specifying contacts and sending copies Hidden from messages
Week 16	Preparatory week before the final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Lab 1	Giving an overview of the programs Word, Excel and PowerPoint and the benefits of each of them, their uses and weaknesses.
Lab 2	Getting to know the Word program - How to open or run the program - Converting the Word program interfac - Word program menus.
Lab 3	Explanations about the main toolbar and menus in general
Lab 4	Writing documents, determining the font size, converting between languages, organizing paragraphs and dimensions between them, coloring the writing, searching for words and replacing them
Lab5	Inserting tables, pictures, shapes, text boxes and controlling them, and inserting page numbering
Lab6	Explanation of how to insert equations with writing them and the details that a mathematics student needs
Lab7	Entering data in Excel - How to navigate in a worksheet - - Shading cells - Clearing cells
Lab8	Midterm exam
Lab9	Using a function from the ready-made functions to a cell with examples and inserting pictures, equations and shapes
Lab10	Creating a special function and applying it to different ranges of the worksheet and from the workbook as well
Lab11	Defining the importance of building a POWER POINT presentation - and entering the program and the progra interface - Creating a new presentation
Lab12	Opening a presentation file - Saving a presentation - Inserting a new slide - Adding shapes to the slide - Slide margins - Slide design - Inserting drawings, shapes and equations to the slide and controlling them
Lab13	Controlling time and movements on shapes and slides
Lab14	Explanations about the importance of the Internet and email with examples and sending and receiving a messa and specifying contacts and sending hidden copies From the messages
Lab15	Practical exam for the end of the course

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Fundamentals of Information Technology	Yes
Recommended Texts	Glend Gay and Ronald B., "Information Technology", 3 rd Ed, CSEC,OUP Oxford ,2019.	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	Evaluation	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	Excellent	90 - 100	Outstanding performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with noticeable errors
	D - Satisfactory	Average	60 - 69	Fair but with significant errors
	E - Sufficient	Acceptable	50 - 59	Work meets minimum standards
Fail Group (0 – 49)	**FX** – Fail	Fail (Under Processing)	(45-49)	More work is required but to achie minimum standards
	F – Fail	راسب	(0-44)	Failure to perform A significant amount work is required

Note: Decimals greater or less than 0.5 will be rounded to the highest or lowest whole mark (e.g. a mark 54.5 will be rounded to 55, while a mark of 54.4 will be rounded to 54. The University has a policy of n condoning “failed close pass” and therefore the only adjustment to marks awarded by the original mark(will be the automatic rounding described above.

The following updates have been added to the semester in accordance with labor market requirements:
1. Modification of lectures for weeks 1 through 7.
2. Inclusion of details for how to send and receive emails in weeks 14 and 15.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Principles of statistics**	**Module Delivery**
Module Type	**Basic**	☒**Theory** ☐ **Lecture** ☐**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**
Module Code	**MS 111**	
ECTS Credits	**4.00**	
SWL (hr/sem)	**100**	

Module Level	UGI	**Semester of Delivery**	2
Administering Department	MS	**College**	CSM
Module Leader	Shahla Mouyad Khalil	**e-mail**	shahlasamer@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ban Ahmad Hassan	**e-mail**	banah.mitras@uomosul.edu.iq
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. Clarifying the basic concepts and introduction to statistics (definitions + examples) 2-Identify the tabular display of aggregated distributions and their types. 3-Graphical representation (polygon histogram and histogram). 4-Measures of concentration (arithmetic mean for classified data and unclassified data with examples). The theorems and the mediator. 5-The harmonic mean with examples. Geometric mean with

	definition and examples. deviation – The mean, variance, and standard deviation of grouped and ungrouped data. 6–The coefficient of variation, the standard degree with examples, and the increasing momentum around zero and its types. – 7–Hyperbolic moments around the arithmetic mean (types + examples), oblateness, and coefficient of variation. 8– Combinations and permutations with some examples.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Clarifying basic concepts, introduction to statistics (definitions + examples). Learn about the tabular display of clustered distributions and their types. Graphical representation (polygon histogram and histogram). Measures of concentration (arithmetic mean for classified data and unclassified data with examples and theorems). The harmonic mean with examples. Geometric mean with definition and examples. deviation The mean, variance, and standard deviation of tabulated and ungrouped data. The coefficient of variation, the standard degree with examples, and the increasing momentum around zero and its types. Hyperbolic moments about the arithmetic mean (types + examples), oblateness, coefficient of variation, combinations, and permutations with some examples.

Indicative Contents المحتويات الإرشادية	Part 1 – Study of basic concepts Introduction to statistics (definitions + examples) Learn about the tabular display of clustered distributions and their types. Graphical representation (polygon histogram and histogram). (10hrs) Measures of concentration) the arithmetic mean of classified data and unclassified data with examples, theorems, and the median (8 hours). The harmonic mean with examples. Geometric mean with definition and examples.(6hrs) The mean deviation for tabulated and non-tabulated data (6hrs) and the variance and standard deviation for tabulated and non-tabulated data. Coefficient of variation and standard score with examples (6 hours) The momentum around zero and its types. Hyperbolic moments about the arithmetic mean (types + examples (6hrs)), oblateness and coefficient of variation with definition and examples (4hrs), combinations and permutations with some examples and correlation (6hrs) To apply statistics in practical life, the results must be understood, interpreted correctly, and applied.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to participate in solving exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by looking at types of simple experiments that include some sampling activities that are of interest to students.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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	15% (15)	5 ,7 and 10	LO #1, #2 and #10, #11
	Assignments	2	15% (15)	2 ,8 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	---		Continuous	All
	Report	1	10%(10)	13	lo#5 , #8 and #10
Summative assessment	**Midterm Exam**	1r and half	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Introduction to the concept of statistics (definitions + examples)
Week 2	Learn about the tabular display of clustered distributions and their types. Graphical representation (histogram, polygon, histogram).
Week 3	Measures of concentration (arithmetic mean for grouped data and ungrouped data with examples). And theorems
Week 4	The mediator.
Week 5	The harmonic mean for classified data and for unclassified data with examples.
Week 6	The geometric mean of classified data and unclassified data with definition and examples.
Week 7	The mean deviation of classified and unclassified data.
Week 8	And the variance for classified and unclassified data
Week 9	Coefficient of variation and standard score with examples
Week 10	The momentum around zero for classified data and for unclassified data, with definition and examples.
Week 11	Hyperbolic moment about the arithmetic mean of tabulated data with examples.
Week 12	Hyperbolic moment about the arithmetic mean of ungrouped data with examples.
Week 13	Flatness and coefficient of variation with some examples.
Week 14	Combinations and permutations with some examples.
Week 15	**Advanced Exercises**

Delivery Plan (Weekly Lab. Syllabus) N/A المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	مبادئ الاحصاء المؤلف :خاشع الراوي	**Yes**
Recommended Texts	**مصادر عديدة في الانترنيت**	**Yes**
Websites	**https:// www.wolframalpha.com .**	

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.

Study the definition of accumulated variance and its properties with examples in view of the requirements of the labor market.

Scorned Level / Bologna Path

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Probability**			**Module Delivery**	
Module Type	**Core**			☒Theory ☐Lecture ☐Lab ☒Tutorial ☐Practical ☐Seminar	
Module Code	**MS 204**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MS		**College**	CSM	
Module Leader	Shahla Mouyad Khalil		**e-mail**	shahlasamer@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Dr. Ban Ahmad Hassan		**e-mail**	banah.mitras@uomosul.edu.iq	
Scientific Committee Approval Date	18/9/2024		**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Clarifying the basic concepts of probability.

	2. Learn about Bayes' theorem and conditional probability. 3. Identify discrete distributions and know how to find expectation and variance. 4. Identify continuous distributions, know how to find expectation and variance, and study theorems based on them 5-Study of the probability density function, probability mass, and joint probability density function . 6- Study the probability density function, the probability mass, and the joint probability density function.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student should mention the basic definitions 2. Learn about the introduction and basic definitions of the topic of probability 3. Distinguishing between the probability density function, the probability mass function, and the joint probability density function with various examples. 4-Identify discrete distributions and their types and study examples of them with theorems for expectation and variance. 5-The student describes the method. 6-Explain the mathematical formula of the method. 7- Summarize the steps to solve the method. 8-Apply the method to a numerical problem. 9-Tabulate and discuss results.
Indicative Contents المحتويات الإرشادية	1- Introduction and basic definitions of the topic of probability (10 hours)

	2-Study of Bayes' theorem and conditional probability (10 hours) 3-Identify discrete distributions and their types (10 hours) 4-Study examples with theorems of expectation and variance (10 hours) 5-Identifying continuous distributions, the most important of which are the normal and standard normal distribution, with examples of them (12 hours) 6-Finding the moment generation function and the probability generation function for distributions, and learning about the probability density function, the probability mass function, and the joint probability density function with various examples. (10 hours)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to engage in exercises, while at the same time improving and expanding their critical thinking skills. This will be accomplished through interactive classes and tutorials and by looking at types of simple experiments that include some sampling activities of interest to students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
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	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment التقييم التكويني	**Quizzes**	4	20% (20)	4 -5-8-10	LO #1, #2 and #7, #8
	Assignments	2	10% (10)	6 -12	LO #3, #4 and #5, #6, #8
	Projects / Lab.				
	Report	1	10% (10)	13	LO #5, #7 and #8
Summative assessment التقييم التلخيصي	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Random variables (definitions + examples)
Week 2	Examples of probability
Week 3	Bayes' theorem + conditional probability + examples
Week 4	Binomial distribution + theorems
Week 5	Poisson distribution + theorems + examples
Week 6	Kamma distribution
Week 7	Normal distribution + examples + theorems
Week 8	Standard normal distribution + examples + theorems
Week 9	Mid–course exam
Week 10	Exponential distribution + regular distribution
Week 11	Probability density function (definitions + examples)

Week 12	Probability mass function (definitions + examples)
Week 13	Moment generation function (definitions + application of the function to distributions)
Week 14	Joint probability density function (theorems + examples)
Week 15	Bernoulli distribution + theorems
Week 16	Random variables (definitions + examples)

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 النصوص المطلوبة	**1-** باسل يونس ذنون " الاحتمالية والاحصاء 2- ثروت محمد عبد المنعم "مدخل حديث للاحصاء والاحتمالية" 2011	Yes
Recommended Texts		No
Websites		

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 – 100	Outstanding Performance أداء مذهل
	B - Very Good	جيد جدا	80 – 89	Above average with some errors فوق المتوسط مع بعض الأخطاء
	C – Good	جيد	70 – 79	Sound work with notable errors العمل السليم مع أخطاء ملحوظة
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings

				عادل ولكن مع نواقص كبيرة
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria العمل يلبي الحد الأدنى من المعايير
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded مطلوب المزيد من العمل ولكن الائتمان الممنوح
	F – Fail	راسب	(0-44)	Considerable amount of work required قدر كبير من العمل المطلوب

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.

Studying the definition of the marginal probability density and mass function and its properties with examples and theorems in view of the requirements of the labor market.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language 2**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2012**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	MS		**College**	CSM	
Module Leader	Marwa Adnan Ismael		**e-mail**	Marwa-Adnan@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Dr. Ekhlass Saadallah		**e-mail**	drekhlass-alrawi@uomosul.edu.iq	
Scientific Committee Approval	18/09/2024		**Version**	2.0	

Date		Number	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- Learn about language and its relationship to society 2- The student learns about the functions of language, its characteristics and advantages 3- Learns the difference between bilingualism and linguistic duality 4- The student knows linguistic phenomena in terms of syntax and intonation 5- The student knows the phenomenon of contrast, verbal homonym and synonymy 6- The student knows the phenomenon of alleviation and derivation 7- The student knows the phenomenon of Arabization, coining and generation in Arabic 8- Say and do not say: common mistakes among speakers and writers 9- Know the linguistic triangle of the linguistic term 10- Learn about the sentence that has a place in syntax and that does not have a place in syntax 11- Learn about the history of Arabic dictionaries and the difference between the source and the reference.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- The student learns about the history of the Arabic language and its relationship with other sciences, especially from a societal perspective. 2- The student learns the difference between linguistic duality and bilingualism. 3- Learn how to use linguistic duality and bilingualism in daily life. 4- The student knows the phenomena of the Arabic language. 5- The student learns how the grammatical movement affects the meaning of the word. 6- The student knows the characteristics of Arabic. 7- The student knows the common linguistic errors among speakers. 8- The student knows the Arabic sentence and how to differentiate between sentences that have a place in grammar and those that do not have a place in grammar. 9- The student learns about the history of the Arabic dictionary. 10- Learn about the types of ancient and modern Arabic dictionaries. 11- Know the difference between the source and the reference. 12- The prose piece helps the student on how to apply linguistic issues to Arabic texts. 13- Learning linguistic skills: developing linguistic taste and improving the style of learners
Indicative Contents	1- Language and its relationship to society [2 hours] 2- Knowledge of language and its functions, 2 hours

المحتويات الإرشادية	3- Recognizing linguistic duality and bilingualism, 2 hours 4- The student's knowledge of the characteristics and advantages of the Arabic language, 2 hours 5- The student's knowledge of the phenomenon of syntax, 2 hours 6- The student's knowledge of the phenomenon of intonation and intonation, 2 hours 7- The student's knowledge of the phenomenon of verbal ambiguity and contrast, 2 hours 8- Recognizing the phenomenon of alleviation and derivation, 2 hours 9- Learning the phenomenon of Arabization, 2 hours 10- Recognizing sculpture in Arabic and its methods, 2 hours 11- Say and do not say: common mistakes among speakers and writers, 2 hours 12- A prose piece, a linguistic and semantic study, 2 hours 13- Recognizing sentences that have a place in syntax and those that do not have a place in syntax, 2 hours Learn about the history of the Arabic dictionary and its types, 2 hours -14

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this unit is to encourage students to participate in speaking and writing Arabic correctly, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by considering the types of simple experiments that include some sampling activities that interest students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5, 10 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (20)	2,5 and 12	LO #3, #4 and #6, #7
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	1hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Language and its relationship to society
Week 2	Bilingualism and bilingualism
Week 3	Characteristics and advantages of Arabic
Week 4	Phenomena of the Arabic language
Week 5	The phenomenon of intonation
Week 6	The phenomenon of verbal homonym
Week 7	Review and exam
Week 8	The phenomenon of derivation and synonymy
Week 9	The phenomenon of alleviation, Arabization and coining
Week 10	An applied study of a prose piece
Week 11	Linguistic issues Say and do not say
Week 12	The linguistic triangle
Week 13	An analytical image of poetic verses
Week 14	The Arabic sentence
Week 15	**The dictionary in Arabic**
Week 16	**End of semester exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Bin Dharel, Adnan, "Language and Style: A Study," Second Edition, 2006	No
Recommended Texts	Bahri, Saeed Hassan, "The Basis of Arabic Linguistics," 2000	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Advanced Calculus (1)**		**Module Delivery**	
Module Type	**Core**		☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MS 201**			
ECTS Credits	**5**			
SWL (hr/sem)	**200**			
Module Level	UGII		**Semester of Delivery**	3
Administering Department	MS		**College**	CSM
Module Leader	Saad Fawzi Al-Azzawi		**e-mail**	saad_alazawi@uomosul.edu.iq

Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ahmad Mohammad	**e-mail**	ahmedgraph@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Calculus (1)	**Semester**	
Co-requisites module	Calculus (2)	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	This study aims to explore the concept of multivariable functions by examining partial derivative and Higher order partial derivatives, including Laplace Equation. It also covers essential topics such as the Chain rule, Implicit Differentiation, directional derivative and the gradient. Additionally, the study analyzes Tangents Plane and Normal Lines on the Surface. Furthermore, it delves into the concept of extreme values, methods for testing them, and their practical applications, with a particular emphasis on using the Lagrange method for their determination. Moreover, the study introduces the double integral and extends the concept of integration to multivariable functions. It explores methods for evaluating double integrals, including reversing the order of integration and applying integration in polar coordinates. Practical applications, such as calculating volume, area, mass, and moments, are also discussed. The study further examines the triple integral by covering its fundamental principles, computation methods, and variable transformations. Cylindrical and spherical coordinates are utilized for evaluating triple integrals, along with a review of their diverse practical applications.
Module Learning	1. Learn the concept of partial derivative

Outcomes مخرجات التعلم للمادة الدراسية	2. Solve examples of chain rule problems 3. How to find and classify extreme values in addition to using Lagrange's theorem 4. Solve some applied problems using Lagrange's theorem 5. Learn the concept of double integrals and inverting the limits of integration. 6. Address some applications such as areas and volumes 7. Solve double integrals using polar coordinates
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Partial Derivative Definition of Partial derivative with some examples, Definition of Higher order partial derivatives with some examples such as Laplace Equation , some basic theorems of the chain rule, implicit differentiation. [20 hrs] Extrema values Studying some theories about extreme values with solving some examples, as well as addressing some practical examples related to extreme values, using the Lagrange method and comparing with previous methods. [15 hrs] Double Integrals Definition of double integrals with examples, Reverse the order of integration, applications of double integrals in calculating areas and volumes, double integrals in polar coordinates with some physical applications (masses and moments in two dimensions). [20 hrs] Triple integrals Triple integrals in Cartesian coordinates, triple integrals in cylindrical coordinates, triple integrals in spherical coordinates, with some physical applications . [20 hours]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية				
	Time/Num	**Weight (Marks)**	**Week Due**	**Relevant Learning**

		ber			Outcome
Formative assessment	**Quizzes**	3	15% (15)	5,8,10	LO #1, 2, 3
	Assignments	3	15% (15)	2, 7,12	LO # 1-4
	Projects / Lab.				
	Report	1	10%(10)	10	L0 # 4
Summative assessment	**Midterm Exam**	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in Functions of Several Variables
Week 2	Higher order partial derivatives, Laplace Equation.
Week 3	Chain rule
Week 4	Implicit Differentiation
Week 5	Tangents Plane and Normal Lines on the Surface
Week 6	short - course exam
Week 7	Extrema values (The way of test)
Week 8	Lagrange method +Application of Extrema values
Week 9	Mid - course exam
Week 10	Multiple Integrals (Reverse the order of integration)
Week 11	Applied of Double Integration in Calculate Areas and Volumes
Week 12	Double Integrals in Polar Coordinates
Week 13	Triple integrals
Week 14	Triple Integrals in Cylindrical Coordinates
Week 15	Triple Integrals in Spherical Coordinates
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Thomas G. B. , Calculus and Analytic Geometry, 4th, 1984. 2- Durfee W.H., Calculus and Analytic Geometry, New York, 1971.	Yes

	Dovermann K. H. Applied Calculus Math, 1999.	
Recommended Texts	1- Thomas, Calculus, 12th, 2010. 2- Thomas, Calculus, 15th, 2024	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.

Some important applications of maximum values in finding volumes (cube, rectangular parallelepiped) have been updated and added, and this study has been used in designing and creating some shapes at the lowest cost, such as water tanks used in buildings and fish tanks.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Group Algebra**	**Module Delivery**
Module Type	**Core**	☒**Theory**

Module Code	**MS 203**			☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		MS	**College**	CSM	
Module Leader	Shaimaa Hatim Ahmed		**e-mail**	shaymaahatim@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**Module Leader's Qualification**		M.SC.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Raida Dawood	**e-mail**	raida.1961@uomosul.edu.iq	
Scientific Committee Approval Date		18/09/2024	**Version Number**		2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Giving the student definitions of groups and their examples and theorems. 2. Make the student distinguish between groups, cyclicgroups, and subgroups 3. The ability to describe different theorems to study the types and characteristics of group.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the concept of algebraic structure, especially groups 2. Identify examples of non-commutative groups 3. How to find subgroups 4. How to find division groups with Lagrange's theorem 5. Study the concept of group homomorphism.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1

	Definition of semi-group and group with some examples, Definition of abelian group and cyclic group with some examples, Cyclic group, Some fundamental theorems of group, direct product Group. [15 hrs] Chapter 2 Definition of sub-group and center of group with some examples and theorems, Product of two sub-group and some theorems, Normal sub-group and Quotient Groups, Lagrange theorem's and index of sub-group. [15 hrs] Chapter 3 Homomorphisms of Definition and examples, Kernel of function, Isomorphism and basic properties, The fundamental Theorems Factor theorem and First theorem, [15 hrs] Chapter 4 Integer group modulo n, (Congruent modulon) groups of Zn and theorems . [15 hrs] Chapter 5 Symmetric group of G with theorems . [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5

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**	3	15% (15)	5,8,10	LO #1, 2, 3
	Assignments	3	15% (15)	2, 7,12	LO # 1-4
	Projects / Lab.				
	Report	1	10%(10)	10	L0 # 4
Summative assessment	**Midterm Exam**	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Definition and Elementary Properties of group
Week 2	Definition of semi-group and group with some examples
Week 3	Definition of abelian group and cyclic group with some examples
Week 4	(Cyclic group)
Week 5	Some fundamental theorems of group
Week 6	Direct product Group
Week 7	Definition of sub-group and center of group with some examples and theorems
Week 8	Product of two sub-group and some theorems
Week 9	Normal sub-group and Quotient Groups
Week 10	Lagrange theorem's and index of sub-group
Week 11	Homomorphisms of Definition and examples
Week 12	Kernel of function, Isomorphism and basic properties
Week 13	The fundamental Theorems Factor theorem and First theorem
Week 14	(Congruent modulo) groups of Zn and theorems
Week 15	Symmetric group of G with theorems
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Abstract Algebra, David, M. Burton, 1988..	Yes
Recommended Texts	The Theory of Groups, Macdonald, Qxford. The Theory of Groups, Rotman, J.J., 2nd, Baton	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.

We update the semester by adding concept for (Congruent modulo) groups of Zn and theorems with some basic properties. This subject is important for the labor market because congruent theory is important in applications such as code theory.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Mathematical physics**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 205**		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		

Module Level	UGII	**Semester of Delivery**	3
Administering Department	MS	**College**	CSM
Module Leader	Rutaina Jassim Essa	e-mail	rotinajasim@uomosul.idu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Saad Fawzi	**e-mail**	saad_alazawi@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Introduce students to the mathematical tools and techniques that are used to model physical phenomena. 2. Develop students' understanding of the mathematical concepts and principles that underpin classical mechanics, quantum mechanics,

	electromagnetic theory, and thermodynamics. 3. Help students develop the ability to perform mathematical calculations and solving problems common to mathematical physics. 4. Encourage students to think critically and analytically about the relationship between mathematical models and physical reality. 5. Provide students with the opportunity to apply mathematical principles and techniques to real-world physical problems. 6. Enhance students' communication and presentation skills through the use of technical language and scientific notation. 7.Facilitate the development of research skills, including the ability to identify and evaluate sources of information, and to conduct independent research in the field of mathematical physics. 8. Foster an appreciation for the beauty and elegance of mathematical models and their applications in physics. 9.Promote an understanding of the interdisciplinary nature of physics and the importance of collaboration across different fields of study.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a strong understanding of the mathematical principles and techniques that underpin classical mechanics, quantum mechanics, electromagnetism, and thermodynamics. 2. Apply mathematical principles and techniques to solve problems and model physical phenomena in classical mechanics, quantum mechanics, electromagnetism, and thermodynamics. 3. Interpret mathematical models and analyze their physical significance using scientific reasoning. 4. Demonstrate the ability to perform mathematical calculations accurately, efficiently and correctly, using appropriate tools such as computer-based programs or software. 5. Communicate mathematical physics concepts clearly and effectively through verbal, written, and visual means, using appropriate technical language and notation. 6. Conduct independent research using appropriate resources, identify relevant resources, and critically evaluate and interpret scientific information. 7. Collaborate effectively with team members in the development of mathematically based models in the physical sciences. 8. Develop an appreciation for the elegance and beauty of the mathematical models in physics and their applications in the natural world. 9. Understand and appreciate the interdisciplinary nature of physics and the need for integration of different fields of study in solving scientific problems.
Indicative Contents المحتويات الإرشادية	1. Vector Analysis: Vector algebra, vector calculus, and vector identities.[6 hrs] 2. Differential Equations: Ordinary differential equations, partial differential equations, Laplace transforms, and Fourier series. [6 hrs] 3. Classical Mechanics: Newton's laws of motion, Lagrangian mechanics, Hamiltonian mechanics, and conservation laws. [3 hrs] 4. Quantum Mechanics: Schrödinger equation, wave functions,

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Practice regular problem-solving: Mathematical physics is a subject that requires practice. Therefore, it is essential to solve a large amount of mathematical problems regularly. 2. Master the fundamentals: Mathematical physics involves several mathematical concepts and formulas. It is ideal to have a strong understanding of the basics of mathematics to effectively master the material. 3. Understand the physical concepts: Mathematical physics is an integrated study of mathematical and physical theories. Understanding the underlying principles of physics is essential for mastering the subject. 4. Read the textbook and lecture notes: Textbooks and lecture notes offer a more structured approach to understanding the subject. It helps to read the assigned readings before attending lectures and completing the assigned practice problems. 5. Collaborate with peers: Studying in groups gives opportunities to work through difficult problems, compare notes, and share insights. Active group participation can improve problem-solving techniques and encourage discussion of concepts. 6. Err on the side of overlearning: To gain mastery of the subject, one must be persistent and committed to the learning process. Incorporate both intentional and unintentional types of learning. 7.Seek guidance from instructors: Instructors are available to help learners with any difficulties they may encounter in attempting to understand the material. You can ask questions in class, during office hours, and through email communication.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

	Time/Num	Weight (Marks)	Week Due	Relevant Learning

		ber			Outcome
Formative assessment	**Quizzes**	2	20% (20)	5 and 10	LO #1, #2 and #10, #11
	Assignments	5	10% (10)	2,5,7,9,12	LO #3, #4 and #6, #7
	Projects / Lab.				
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Vector: process of vectors , multiplication , Dot product , cross product , use of vectors in physics.
Week 2	Classical Mechanics : displacement , vetocity , acceleration in one dimension, Free falling of body
Week 3	velocity acceleration in two dimension , motion of projectle
Week 4	Circular motion , Relation between linear and circular motion
Week 5	Forces : kind of force in nature , Newton Laws of 1^{st} , 2^{nd} Laws . The inclined plain
Week 6	Atwood Mechine , Fraction force , Coefficient of friction
Week 7	Force and weight in Elevator.
Week 8	Work and Energy , work and kinetic energy , potential energy
Week 9	Conservation of Mechancal Energy , total Mechanical Energy .
Week 10	System of particles , Momentum and collisions : system of particls , Newton law for system of particals , Center of mass
Week 11	Center of mass for few particles, Center ay mass for continuous road.
Week 12	Elastic Collision and in elastic Collision
Week 13	wave equation : wave , wave in string , oscillation , simple harmonic motion .
Week 14	Mass an spring , energy of mass of the spring
Week 15	Solution of wave equation .

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	1. "Mathematical Methods in the Physical Sciences" by Mary L. Boas. 2. "Mathematical Methods for Physicists" by George B. Arfken and Hans J. Weber.	Yes
Recommended Texts	1. "Mathematical Tools for Physics" by James Nearing. 2. "Introduction to Electrodynamics" by David J. Griffiths.	No
Websites	Internet , youTube	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Ordinary Differential Equations**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 202**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		MS	**College**	CSM	
Module Leader	Merna Adel Aziz Samarchi		**e-mail**	merna_samarchi@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Ekhlass Saadallah	**e-mail**	drekhlass-alrawi@uomosul.edu.iq	
Scientific Committee Approval Date		18/09/2024	**Version Number**		2.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To learn the basics of differential equations 2. To learn the classification and types of differential equations. 3. Training the student on methods and strategies for solving differential equations. 4. Identify the applications of differential equations in different fields such as physics, chemistry and engineering sciences.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the basics concepts of differential equations 2. The ability to recognize between types of differential equations of the first order. 3. The ability to distinguish between methods of solving ordinary differential equations of first order. 4. Gaining the ability and skill to use methods of solving first order differential equations and dealing with them. 5. learning the linear homogenous and non-homogenous differential equations with constant coefficients of n-th order. 6. The ability to solve linear homogenous and non-homogenous differential equations with constant coefficients of n-th order by using different methods. 7. learning the Linear differential equations with variable coefficient like Euler equation and the method of solving this equation 8. Gaining the ability to analyze, explain and solve problems. 9. Providing the student with the skills of communication, expression and discussion to stimulate mathematical thinking, understanding and solving mathematical issues.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 Fundamental concepts, differential equations, order of differential equation, degree of differential equation, solution of differential equation, kinds of solution, formulation of differential equation, initial value problem. [15 hrs] Chapter 2 Differential equations of first order and first degree, equations of separation variables, homogenous equations, differential equation with linear coefficients, exact and non- exact equations, linear differential equation and Bernoulli equation, some physical and economic application to differential equations with examples . [15 hrs] Chapter 3 Linear differential equation of n th order with constant Coefficient, linearly dependent functions, linearly independent functions, Wronskian determinate. Operator method, examples. [15 hrs] Chapter 4 Linear homogenous differential equation with constant coefficients of n-th , Characteristic equation roots, linear non - homogenous differential equation with constant coefficients of n-th, Undetermined Coefficients method , Variation of parameters, examples. [15 hrs]

	Chapter 5 Linear differential equations with variable coefficient, Euler equation, solving differential equations by power series, examples [15 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Managing the lecture in a practical way related to the reality of daily life to attract the student to the topic of the lesson Without straying from the heart of the matter, so that the material is flexible and subject to understanding and analysis. Assigning the student some group activities and duties. Allocate a percentage of the grade for daily assignments and tests. Active participation in the classroom is evidence of the student's commitment and responsibility. Commitment to the deadline for submitting assignments and research. The quarterly and final exams reflect commitment and knowledge and skill achievement. Daily applications, exercises and homework

Student Workload (SWL)
الحمل الدراسي للطالب

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	6
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**	3	30% (30)	3,7, 15	LO #1-4 ,6 and 7
	Assignments	5	5% (5)	2,4,6,11,13	LO # 1,3,4,5 and 8
	Projects / Lab.				
	Report	1	5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamental concepts, Differential equation, order of D.E. , degree of D.E., Solution of D.E.
Week 2	Kinds of solutions, formulation of D.E., Initial value problem, examples
Week 3	Differential Es. of first order and first degree, equations of separation variables, examples.
Week 4	Homogeneous D.Es. and equations with linear coefficients, methods of solution, examples.
Week 5	Exact and not Exact differential equations, integral factor, examples
Week 6	Linear differential equation and Bernoulli equation, methods of solution, some physical and economic application to differential equations, examples.
Week 7	Linear D.Es. of n- th order with constant coefficients and the linearly independence, examples.
Week 8	Mid-term Exam
Week 9	Linear differential equations with constant coefficients and the operator method, examples.
Week 10	Linear homogenous D.Es. with constant coefficients, Characteristic equation roots, examples.
Week 11	linear non homogenous D.Es. with constant coefficients, Undetermined Coefficients, examples
Week 12	linear non homogenous D.Es. with constant coefficients, Variation of parameters, examples
Week 13	Linear differential equations with variable coefficient, Euler equation.
Week 14	Homogenous Euler equation, method of solution, examples.
Week 15	Non -homogenous Euler equation, method of solution, solving D.Es. by power series examples.
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	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1) خالد أحمد السامرائي ويحيى عبد سعيد، "طرق حل المعادلات	Yes

	التفاضلية " وزارة التعليم العالي والبحث العلمي، 1980. 2) فرانك ايرز" المعادلات التفاضلية " ملخصات شوم ، ترجمة نخبة من الاساتذة المتخصصين ، دار ماكجر وهيل للنشر، 1972	
Recommended Texts	1. Elementary differential equations – Earl D. Rainville and Bedient E, 1990 2. Ordinary Differential Equations, Gabriel Nagy, 2021	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.

The following updates for the semester have been added according to the requirements of the labor market, since the differential equations play an important role in all other science

1. Some physical and economic applications of differential equations
2. Solving differential equations using power series

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Methodology of Scientific Research**	**Module Delivery**
Module Type	**Basic**	☒ **Theory**

Module Code	**MS 206**		☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	UGII	**Semester of Delivery**	3	
Administering Department	MS	**College**	CSM	
Module Leader	Susan Hassan Mohammed	**e-mail**	Susan.al-hakam@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Dr. Ahmad Mohammed	**e-mail**	ahmedgraph@uomosul.edu.iq	
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- Understand the nature and importance of scientific knowledge 2- Identify the different types of scientific research. 3- Learn how to identify and define the research problem 4- Develop skills in evaluating research problems. 5- Learn how to choose an appropriate research methodology for a particular study. 6- Develop skills in collecting and organizing research data.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understand the importance of science and knowledge and their role in the development of society and scientific progress. 2- Identify the types of scientific research and understand the differences between them and their different objectives. 3- Acquire the skills of identifying the research problem and designing a research study related to it. 4- The ability to evaluate the research problem and formulate a testable hypothesis.

	5- Understand the importance of choosing the appropriate research method to achieve the objectives of the research study. 6- Acquire the skills of collecting and classifying data related to scientific research. 7- Learn how to organize and manage the collected data to ensure easy access and analysis. 8- Understand the differences between primary and secondary data sources and use them effectively in scientific research. 9- Develop data analysis skills and present results in an accurate and appropriate manner. 10- Enhance the ability to read research sources and be able to extract important information from them.
Indicative Contents المحتويات الإرشادية	The guiding content includes the following: Science and knowledge, scientific research and its types, characteristics of scientific research and defining the research problem, evaluating the research problem and formulating the hypothesis, defining the research methodology [6hrs.] Collecting and classifying data, tabulating and managing data, types of data sources (primary, secondary), analyzing and presenting data results [6 hrs.] Reading research sources, scientific methods and rules in writing research, methods of fixing and writing footnotes, meaning of footnotes for research and preparing a list of sources, appendices and settings, research summary [5 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this unit is to encourage students to participate in exercises, while at the same time improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials and by considering types of simple experiments that include some sampling activities that interest students.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies			
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	5, 11 and 13	LO #1, #2 and #9, #10
	Assignments	3	15% (15)	3,7 and 12	LO #3, #4 and #6, #7
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Science and Knowledge
Week 2	Scientific Research and its Types
Week 3	Characteristics of Scientific Research and Defining the Research Problem
Week 4	Evaluating the Research Problem and Formulating the Hypothesis
Week 5	Determining the Research Methodology
Week 6	Research title and how to formulate it + Collecting and Classifying Data
Week 7	Tabulating and Managing Data
Week 8	Mid-Term Exam + Types of Data Sources (Primary, Secondary)
Week 9	Analysis and Presentation of Data Results
Week 10	Reading Research Sources
Week 11	Scientific Methods and Rules in Writing Research
Week 12	Methods of Fixing and Writing Footnotes
Week 13	The Meaning of the Footnote for Research and Preparing a List of Sources+ Quotation and its types
Week 14	Appendices and Settings
Week 15	Research Summary
Week 16	Preparatory week before the final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	There are no laboratories
Week 2	There are no laboratories
Week 3	There are no laboratories
Week 4	There are no laboratories
Week 5	There are no laboratories
Week 6	There are no laboratories
Week 7	There are no laboratories

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Abdul Karim, Abdul Aziz Mustafa and Kadawi, Talal Mahmoud, (2006), "Basics of Scientific Research in the Humanities", Ibn Al-Atheer House for Printing and Publishing, University of Mosul, Iraq.	Yes
Recommended Texts	none	No
Websites	https://www.coursera.org/learn/research-methodologies	

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
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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	F – Fail	راسب	(0-44)	Considerable amount of work required

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Update:
Adding the following topics:
1- Research title and how to formulate it (Week 6)
2- Quotation and its types (Week 13)

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**English 2**		**Module Delivery**	
Module Type	**Support**		☒Theory ☒Lecture ☒Lab ☐Tutorial ☐Practical ☐Seminar	
Module Code	**UOM2022**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	UGII	**Semester of Delivery**	4	
Administering Department	MS	**College**	CSM	
Module Leader	Reem Abduljabar Yahya	**e-mail**	Reem.alsaqa@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Master	
Module Tutor		**e-mail**		
Peer Reviewer Name	Dr. Ghada Moayad	**e-mail**	drghadaalnaemi@uomosul.edu.iq	
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	11. Language Proficiency: Develop basic language proficiency in English, including listening, speaking, reading, and writing skills. 12. Grammar: Understand and apply basic grammatical structures, including parts of speech, sentence formation, verb tenses, subject-verb agreement, and basic sentence patterns. 13. Vocabulary Building: Expand vocabulary through learning and practicing common words, synonyms, antonyms, idioms, phrasal verbs, and collocations. 14. Reading Comprehension: Improve reading skills by understanding main ideas, supporting details, making inferences, and analyzing texts of varying complexity. 15. Listening Comprehension: Enhance listening skills by understanding spoken English, including conversations, lectures, and presentations, and extracting key information. 16. Speaking Skills: Develop oral communication skills through practicing pronunciation, participating in conversations, giving presentations, and expressing opinions. 17. Writing Skills: Enhance writing abilities by practicing sentence construction, paragraph development, descriptive writing, narrative writing, and basic essay structure. 18. Cultural Awareness: Gain cultural understanding and appreciation through exposure to English-language literature, media, and diverse perspectives. 19. Study Skills: Develop effective study strategies, note-taking techniques, and time management skills for English language learning. 20. Assessment: Demonstrate language proficiency through quizzes, tests, presentations, writing assignments, and class participation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the English 2 course for the mathematics department, students should be able to demonstrate the following learning outcomes: 11. Demonstrate basic proficiency in listening, speaking, reading, and

	writing skills in English. 12. Apply grammatical structures accurately to communicate effectively in written and spoken English. 13. Expand their vocabulary and use appropriate words and phrases in various contexts. 14. Comprehend and analyze written texts of different genres, including articles, short stories, and essays. 15. Understand spoken English in various situations, such as conversations, lectures, and presentations. 16. Engage in effective verbal communication, express opinions, and participate in discussions. 17. Write clear and coherent sentences, paragraphs, and short essays using proper organization and language conventions. 18. Develop cultural awareness and sensitivity to different cultural perspectives reflected in English literature and media. 19. Apply effective study skills, including note-taking, time management, and self-assessment techniques. 20. Demonstrate language proficiency through assessments, including quizzes, exams, presentations, and writing assignments.
Indicative Contents المحتويات الإرشادية	The indicative contents for the English 2 course may include the following topics: 9. Introduction to English Language: ○ Basic grammar rules and sentence structure ○ Parts of speech: nouns, verbs, adjectives, adverbs, etc. ○ Simple sentence construction and punctuation 10. Vocabulary Building: ○ Commonly used words and expressions ○ Word formation: prefixes, suffixes, and root words ○ Synonyms, antonyms, and idiomatic expressions 11. Reading Comprehension: ○ Developing reading skills through texts of varying difficulty ○ Understanding main ideas, supporting details, and inference ○ Practicing skimming and scanning techniques 12. Writing Skills: ○ Paragraph writing: topic sentences, supporting details, and concluding sentences ○ Sentence structure and paragraph coherence ○ Developing basic writing skills: descriptive, narrative, and expository writing 13. Listening Skills: ○ Listening to and understanding spoken English in different contexts ○ Note-taking and summarizing information from spoken sources ○ Developing listening comprehension through audio materials and dialogues 14. Speaking Skills: ○ Basic conversation skills: greetings, introductions, and simple dialogues

	○ Pronunciation and intonation practice ○ Participating in group discussions and oral presentations 15. Cultural Awareness: ○ Exploring English-speaking countries and their cultures ○ Understanding cultural differences and norms in communication 16. Language Practice and Activities: ○ Role plays, pair work, and group activities to practice language skills ○ Language games, quizzes, and interactive exercises for reinforcement These indicative contents provide a general overview of the topics and skills covered in the English 2 course, focusing on developing foundational language skills in reading, writing, listening, and speaking.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the English 2 course aim to create an engaging and interactive learning environment where students can actively participate and develop their language skills. Some effective strategies include: 10. Communicative Approach: Emphasizing the use of English for meaningful communication, allowing students to practice and apply language skills in real-life situations through role plays, pair work, and group activities. 11. Task-based Learning: Providing students with practical tasks and projects that require them to use English to achieve specific goals, fostering critical thinking, problem-solving, and collaboration skills. 12. Multi-modal Learning: Integrating various learning resources such as textbooks, audio recordings, videos, and online materials to cater to different learning styles and enhance comprehension and language acquisition. 13. Scaffolded Instruction: Breaking down complex language concepts into manageable steps, providing clear instructions, and gradually increasing the level of difficulty to ensure students' understanding and progress. 14. Formative Assessment: Implementing regular quizzes, assignments, and in-class activities to gauge students' understanding and provide timely feedback for improvement. 15. Technology Integration: Utilizing digital tools and resources, such as language learning apps, online dictionaries, and multimedia platforms, to enhance language practice, vocabulary acquisition, and listening comprehension. 16. Authentic Materials: Exposing students to authentic English materials, such as news articles, short stories, and videos, to develop their reading and listening skills and expose them to real-world language use.

	17. Error Correction and Feedback: Providing constructive feedback and error correction to guide students in improving their language accuracy and fluency, both in written and spoken English. 18. Cultural Immersion: Incorporating cultural activities, discussions, and projects to promote intercultural understanding and awareness of different English-speaking cultures. By employing these strategies, the English 2 course aims to create an engaging and effective learning environment that fosters students' language proficiency, confidence, and communication skills in English.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Week 1: Introduction to English 2, course overview, and language assessment.
Week 2	Week 2: Grammar: Parts of speech, sentence structure, and basic sentence patterns.
Week 3	Week 3: Vocabulary Building: Basic word formation, synonyms, antonyms, and context clues.
Week 4	Week 4: Reading Comprehension: Developing reading strategies, understanding main ideas, and supporting details.
Week 5	Week 5: Listening Comprehension: Listening for information, note-taking, and understanding spoken dialogues.
Week 6	Week 6: Speaking Skills: Introducing oneself, asking and answering questions, and participating in simple conversations.
Week 7	Week 7: Writing Skills: Sentence construction, paragraph development, and descriptive writing.
Week 8	Week 8: Grammar: Verb complement
Week 9	Week 9: Vocabulary Expansion: Idioms, phrasal verbs, and collocations.
Week 10	Week 10: Reading Comprehension: Inferring meaning, making predictions, and analyzing texts.
Week 11	Week 11: Listening Comprehension: Identifying main ideas, understanding specific details, and listening for inference.
Week 12	Week 12: Speaking Skills: Giving opinions, expressing agreement/disagreement, and presenting short talks.
Week 13	Week 13: Writing Skills: Narrative writing, writing emails, and basic essay structure.
Week 14	Week 14: Grammar: passive voice
Week 15	Week 15: Review and Assessment: Recap of course topics, practice exercises, and final assessment.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	English Grammar In Use.By Raymond Murhpy.	
Recommended Texts	English For Information Technology. By David Bonamy.	
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.

Note: The curriculum above has been modified by 10%(verb complement and passive voice) due to the importance of added topics, aiming more effectively

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Numerical Analysis** (1)		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 209**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	UGII	**Semester of Delivery**	4	
Administering Department	MS	**College**	CSM	
Module Leader	Abdulghafor M. Al-Rozbayani	**e-mail**	abdulghafor_rozbayani@uomosul.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Susan H. Mohammad Muna Mohsen Mohamed Ali	**e-mail**	susan.al-hakam@uomosul.edu.iq munamoh74@uomosul.edu.iq	
Peer Reviewer Name	Dr. Bassim Abbas	**e-mail**	basimah@uomosul.edu.iq	

Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce numerical approximation techniques for solving standard problems in Mathematics. 2. To derive some of these techniques from mathematics principles. 3. To explain how computer software is able to produce numerical solutions, and to enable a judgment of whether the results are reliable. 4. To provide opportunities for implementing numerical techniques on a computer. 5. To develop problem solving skills via numerical methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. Summarize what is meant by a basic numerical methods. 11. Recognize how used numerical methods . 12. Compute error estimates for simple numerical methods. 13. Derive elementary numerical methods from first principles. 14. The student learns how to find the approximate value of nonlinear equations using numerical methods. 15. Apply the numerical methods which discussed to simple examples. 16. The student learns how to find the approximate solutions of linear and nonlinear systems using numerical methods. 17. Implement numerical methods using computer software, and apply them in examples. 18. Understand some elements of computer programming.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Numerical errors Error sources, Define the absolute error and relative error with solving examples, Error sources and errors in calculations(addition, subtraction, multiplication and division)

	and solve examples.[12 hrs] Define the root of the equation and determination of roots positions with solving examples.[10 hrs] Part B - Numerical methods to solve nonlinear equations Numerical methods to solve nonlinear equation , Bisection method and False position method and solving an example and write algorithm, Derivative of the approximation root of Secant method with solving an example and write algorithm, Derivative of the approximation root of Newton-Raphson method and solve examples and write algorithm , Special cases of Newton-Raphson method and solve examples.[14 hrs] Fixed point method with solving several examples and write algorithm , Aitken method and Steffensen's method with solving examples and write properities.[10 hrs] Write program of Bisection, False position, Secant, Newton-Raphson and Fixed point, Write program of Aitken method and Steffensen method.[10 hrs] Part C - Numerical solutions of linear systems (direct methods and iterative methods): Gauss elimination method and Gauss Jordan method to solve linear system of equations, LU-Decomposition methods (Doolittel, Croute and Cholesky) and solve examples, Iterative methods : Jacobi and Gauss-seidel methods. And solving nonlinear systems by Fixed point method and Newton-Raphson method with taking examples and write algorithms.[12 hrs] Write a program of Gauss elimination method, Write a program of Gauss Jordan method, Write a program of LU-Decomposition method and solving examples by programs. Write a program of Fixed point method and Newton-Raphson method to solve nonlinear systems [10 hrs]

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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
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)	87	**Unstructured SWL (h/w)**	6

الحمل الدراسي غير المنتظم للطالب خلال الفصل		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**	2	10% (10)	5, 12	LO #1, 2, 3 and 8
	Assignments	2	10% (10)	3,10	LO # 1, 2, 6 and 9
	Projects / Lab.	2	10% (10)	7,13	LO # 8 and 9
	Report	1	10% (10)	15	LO # 4, 5 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction in numerical analysis and define rounding and chopped.
Week 2	Define the absolute error and relative error with solving an examples.
Week 3	Error sources and errors in calculations(addition, subtraction, multiplication and division) and solve examples , write a duty.
Week 4	Define the root of the equation and determination of roots positions with solving examples.
Week 5	daily exam + Numerical methods to solve nonlinear equation , Bisection method with write algorithm.
Week 6	False position method and solving an example and write algorithm.
Week 7	Derivative of the approximation root of Secant method , solve an example and write algorithm.
Week 8	Mid-term Exam
Week 9	Derivative of the approximation root of Newton-Raphson method and solve examples and write algorithm.
Week 10	Special cases of Newton-Raphson method and solve examples , write a duty.
Week 11	Fixed point method with solving several examples and write algorithm.
Week 12	daily exam + Aitken method and Steffensen's method with solving examples and write properties.
Week 13	Gauss elimination metod , Gauss Jordan method to solve linear system of equations.
Week 14	LU-Decomposition methods (Doolittel, Croute and Cholesky) and solve examples.
Week 15	Iterative methods : Jacobi method, Gauss-seidel method + Report.
Week 16	End-of-course exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	A review of the language MatLab
Week 2	A review of the language MatLab
Week 3	A review of the language MatLab
Week 4	Write program of errors in calculations
Week 5	Write program of Bisection method
Week 6	Write program of False position method
Week 7	Write program of Secant method+ Projects/ Lab.
Week 8	Mid-course exam
Week 9	Write program of Newton -Raphson method and daily examination
Week 10	Write program of Fixed point
Week 11	Write program of Aitken method and Steffensen's method
Week 12	Write program of Gauss elimination method
Week 13	Write program of Gauss Jordan method LU-Decomposition methods(Doolittel,Croute and Cholesky)
Week 14	Write program of Jacobi method+ Projects/ Lab.
Week 15	Write program of Gauss-seidel method
Week 16	End-of-course exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Principles of Numerical Analysis, Dr. Ali Muhammad Siddiq and Ibtisam Kamal Al-Din: 1986	Yes
Recommended Texts	Numerical Methods Using MatLab, fourth edition, John H.M. and Kurtis D.F.(2004).	No
Websites	www.mathworks.com	

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	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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.

The following updates for the semester have been added according to the requirements of the labor market:
1. Steffensen's method with solving examples in part B.
2. Fixed point method and Newton-Raphson method to solve nonlinear systems with taking examples and writing algorithms and programs in part C.
3. LU-Decomposition methods (Doolittel and Croute) and solve examples with write algorithms and programs in part C.

معلومات المادة الدراسية

Module Title	**Advanced Calculus (2)**	**Module Delivery**	
Module Type	**Core**	☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MS 207**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		
Module Level	UGII	**Semester of Delivery**	4
Administering Department	MS	**College**	CSM
Module Leader	Saad Fawzi Al-Azzawi	**e-mail**	saad_alazawi@uomosul.edu.iq
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ahmad Mohammad	**e-mail**	ahmedgraph@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Advanced Calculus (1)	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This study explores masses, moments, and centers of mass using double integration in Cartesian and polar coordinates, as well as masses and moments through triple integration in cylindrical and spherical coordinates. It also examines linear integration, Crane's theorem, and their interrelation, as Crane's theorem establishes the connection between linear integration and double integration by incorporating linear integration with double integrals. Furthermore, the study covers surface area, divergence, rotation, and flow, along with an analysis of the divergence theorem and Stokes' theorem. Additionally, it includes discussions on various examples, surface integration, and Stokes' theorem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identify the basic concepts of moments and centers of mass. 2- Identify finding moments and centers of mass using double and triple integrals. 3- Identify the relationship between linear integrals and Crane's theorem. 4- Identify the basic concepts of divergence and rotation. 5- Use Stokes's theorem to find the work done on vectors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Masses and moments Masses and moments in 2D, masses and moments in 3D, masses and moments in Cartesian and polar coordinates, masses and moments using cylindrical and spherical coordinates.. [25 hrs] Line Integral and Green's Theorem Converting a difficult line integral into a simpler double integral. Verifying the independence of path in a vector field. Computing circulation and flux of a vector field. [25 hrs] Surface Area and Divergence and Circulation Surface Area, Flux, Divergence Theorem, Stokes's Theorem. [25 hours]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 أسبوعا	
Structured SWL (h/sem)	93
Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5

الحمل الدراسي المنتظم للطالب خلال الفصل			
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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	3	15% (15)	5,8,10	LO #1, 2, 3
	Assignments	3	15% (15)	2, 7,12	LO # 1-4
	Projects / Lab.				
	Report	1	10%(10)	10	L0 # 4
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General review of triple integrals and the relationship
Week 2	Mass, first moments and centers of mass with double integrals (in polar coordinates)
Week 3	Moment of inertia (second moments) by double integrals
Week 4	Midpoint with some examples solved by double integrals
Week 5	Masses and Moments in Three Dimensions in Cylindrical and Spherical Coordinates
Week 6	short - course exam
Week 7	Line Integral
Week 8	Green's Theorem
Week 9	Integrating Line Integration and Double Integration Using Crane's Theorem
Week 10	Mid - course exam
Week 11	Surface Area
Week 12	Dissipative and conservative
Week 13	Divergence and Circulation Flux
Week 14	Divergence Theorem
Week 15	Stokes's Theorem
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	3- Thomas G. B. , Calculus and Analytic Geometry, 4th, 1984. 4- Durfee W.H., Calculus and Analytic Geometry, New York, 1971. Dovermann K. H. Applied Calculus Math, 1999.	Yes
Recommended Texts	3- Thomas, Calculus, 12th, 2010. 4- Thomas, Calculus, 15th, 2024	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.

The course has been updated by adding the concept of dissipative and conservative through the trace of Jacobian matrix and related theories, which plays an important and effective role in identifying energy dissipative and energy conserving systems and their applications in chaotic dynamic systems.

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Ring Algebra**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**MS 210**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		MS	**College**	CSM	
Module Leader	Shaimaa Hatim Ahmed		**e-mail**	shaymaahatim@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**Module Leader's Qualification**		M.Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name		Dr. Raida Dawood	**e-mail**	raida.1961@uomosul.edu.iq	
Scientific Committee Approval Date		18/9/2024	**Version Number**		2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Giving the student definitions of rings, examples and related theorems 2. Make the student distinguish between rings and subrings. 3. The ability to employ different theorems to study the types and properties of rings.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify the concept of algebraic structure, especially rings 2. Identify examples of non-commutative rings 3. How to find sub rings 4. How to find the division ring

	5. Study the concept of ring homomorphism.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Chapter 1 Definition of ring and some example, Definition of Zero divisor and integral domain , Integral domain and commutative ring with identity with examples , [15 hrs] Chapter 2 Definitions of Sub-ring and center of rings , Some theorems of rings and sub-rings , definitions of Ideals with examples and theorems , [15 hrs] Chapter 3 Prime ideals, maximal ideal and principal ideal , Idempotent elements and nilpotent elements , Jacobson radical of rings and unite elements , [15 hrs] Chapter 4 Definition Quotient Rings with examples and theorems , Polynomial Rings and Boolean Rings , [15 hrs] Chapter 5 Definition of Homomorphisms and isomorphisms, examples and theorems , Definition of fields and sub-fields , [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ 15 أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		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	3	15% (15)	5 ,8, 10	LO #1, 2, 3
	Assignments	3	15% (15)	2,7, 12	LO # 1-4
	Projects / Lab.				
	Report	1	10% (10)	10	LO # 4
Summative assessment	Midterm Exam	1 hr	10% (10)	8	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Definition and Elementary Properties of Rings
Week 2	Definition of ring and some example
Week 3	Definition of Zero divisor with examples and some basic theorems
Week 4	Integral domain and commutative ring with identity with examples and some basic theorems
Week 5	Definitions of Sub-ring and center of rings
Week 6	Some theorems of rings and sub-rings
Week 7	definitions of Ideals with examples and theorems
Week 8	Special ideals and elements such as : Prime ideals, maximal ideal and principal ideal
Week 9	Idempotent elements and nilpotent elements
Week 10	Jacobson radical of rings and unite elements
Week 11	Definition Quotient Rings with examples and theorems
Week 12	Polynomial Rings and Boolean Rings
Week 13	Definition of Homomorphisms and isomorphisms, examples and theorems
Week 14	Definition of fields and sub-fields
Week 15	Some important theorems of fields
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Abstract Algebra, David, M. Burton, 1988	Yes
Recommended Texts	The Theory of Rings Algebra	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.

We update the semester by adding concepts for the field and subfield along with some basic properties. This subject is important for the labor market because field theory is important in applications such as computer and artificial intelligence

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Aims, Learning Outcomes and Indicative Contents

Module Information

معلومات المادة الدراسية

Module Title	**Computer 2**	**Module Delivery**	
Module Type	**Support**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2032**		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	UGII	**Semester of Delivery**	4
Administering Department	MS	**College**	CSM
Module Leader	Enaam Ghanem Saeed	**e-mail**	**enaamghanim@uomosul.edu.iq**
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Noor Rafi' Hamza	**e-mail**	noorrafeh@uomosul.edu.iq
Peer Reviewer Name	Dr. Hamsa Tharwat	**e-mail**	hamsathrot@uomosul.edu.iq
Scientific Committee Approval Date	18/9/2024	**Version Number**	2.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Utilize the computer for fundamental tasks 2. Identify and discuss the hardware components of the computer system. 3. Creating documents using a word processor and creating presentations. 4. Conducting research on the Internet. 5. An introduction to Artificial Intelligence
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enhancing the ability of information technology to adapt and respond to the multiple, renewable and constantly changing needs of all parties benefiting from the outputs of the information system, especially the university leaders in the researched university, and thus enables information technology to carry out its work efficiently and effectively. Predicting the studied phenomenon in the future by means of Box-Jenkins model. 2. Employing information technologies in the axes of the educational process worked to build a bridge of vital communication between faculty members and all sources of the educational process, and this necessarily means facilitating the teacher's task in delivering information to the student within an interactive technical environment, and information technologies provide multiple sources in order to obtain information Whether it is from sources within the university or from the Internet and the educational technologies it contains.
Indicative Contents المحتويات الإرشادية	Although the information technology specialization is one of the most demanded fields currently in all global markets, some specializations range from stagnant to saturated and required, so you should study the market well before choosing a specialization. But if you are looking for the best majors that have a future in the field of information technology, then they are as follows: Network security major in programming - software engineering - 3D printing - data science major - Artificial Intelligence - Computer Science - Aerospace Engineering

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	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, interactive tutorials by Using appropriate teaching strategies and methods and teaching aids to develop thinking skills.

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
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	3hr	10% (10)	7	LO #1 - #7
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Security and Networking: What is a network? Types of networks. Basic network components.
Week 2	Security and Networking (Cont.): Network Security Basics. Understanding network threats.
Week 3	E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking
Week 4	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter,cloud computing and its importance
Week 5	Computer Troubleshooting (Cont.): Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 6	Introduction to Al: Definition of Al, History of Al, Al Techniques and Approaches,
Week 7	Introduction to Al(Cont.): Key Characteristics of Al, Benefits of Al, Challenges and Ethical considerations.
Week 8	The Role of Al in Modern Smartphones: Al-Driven Mobile Technologies, Virtual Assistants (Siri, Google Assistant, Alexa).
Week 9	The Role of Al in Modern Smartphones (Cont.): Adaptive Learning, Real-Time Translation Services.
Week 10	Applications and Tools of Al: Overview of Al Applications in Various Industries, Education and Healthcare.
Week 11	Applications and Tools of Al (Cont.): Transportation, Marketing and Advertising,Application of Artificial Intelligence in Cybersecurity
Week 12	Applications and Tools of Al(Cont.): Finance, Robotics and Automation Technologies.
Week 13	Al and Society: How Al affects social, Al and international relations, Al and the future of humanity.

Week 14	The Future of Al: Future trends in Al, recent research and emerging technologies.
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Showing an explanatory video about networks, their types, components, and how to connect and protect them
Week 2	Training students on online shopping from an online store using an electronic payment card
Week 3	A practical application for computer troubleshooting
Week 4	ıUse software to troubleshoot software and computer systems
Week 5	Implementing some intelligent techniques
Week 6	Practical application
Week 7	Show some applications based on artificial intelligence
Week 8	Implementing programs for adaptive learning and translation
Week 9	Demonstrating real applications of artificial intelligence in industry, education and healthcare
Week 10	Training students to shop using artificial intelligence
Week 11	Practical application of the lecture
Week 12	Showing practical video films
Week 13	Practical application
Week 14	Practical application
Week 15	Showing practical video films

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Ahmed banafa"introduction to Artificial intelligence AI" 1st edition, 2024	no
Recommended Texts	Microsoft Ofice 2016 Step by Step `st Edition by Joan Lambert & Curtis Frye	no
Recommended Texts	مدخل الى عالم الذكاء الاصطناعي ، الدكتور عادل عبدالنور	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.

The following updates have been added to the semester in accordance with labor market requirement
Cloud Computing and Its Importance and Application of Artificial Intelligence in Cyber security

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Partial differential equation**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MS 208**			
ECTS Credits	**5**			
SWL (hr/sem)	**150**			
Module Level	UGII		**Semester of Delivery**	4
Administering Department	MS		**College**	CSM
Module Leader	Rutaina Jassim Essa		**e-mail**	rotinajasim@uomosul.idu.iq
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.
Module Tutor			**e-mail**	
Peer Reviewer Name	Dr. Abdulghafor Mohammed Ameen		**e-mail**	abdulghafor_rozbayani@uomosul.edu.iq
Scientific Committee Approval Date	18/09/2024		**Version Number**	2.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To familiarize the student with the definition and concept of partial differential equations and their formation. 2. That the student recognize the classification of the partial differential in terms of degree and rank. 3. Identify the applications of partial differential equations in various fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and understanding 2. Learn the methods and rules for finding solutions to different partial differential equations with initial and limit values. 3. Students will learn how to expand functions using Fourier series
Indicative Contents المحتويات الإرشادية	The content of the indicative is the following. Part A- Basic definitions Definition of partial differential equations, finding the order and degree of equations, linear partial equation and its features, Part B - Solution Methods The direct solution method, the method of separating the variables, in the event that the molecular equations are homogeneous, inhomogeneous, of the first and second order, expanding the function using the Fourier series

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy to be adopted in this unit is to encourage students to participate in the exercises, while at the same time improving and expanding their thinking skills. This will be achieved through assignments sand how to solve them

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	2	20% (20)	3, 5, 10	LO #1, 2, 3
	Assignments	5	10% (10)	2,7,9,12	LO # 1-4
	Projects / Lab.				
	Report	1	10% (10)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - 3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - First order partial differential equation (Basic definition)
Week 2	First order partial differential equation (linear P.D.E., quasi-linear P.D.E)
Week 3	First order partial differential equation (Lagrang system, some examples)
Week 4	Second order partial differential (ellipse, parabolla)
Week 5	Second order partial differential (hyperola, wave equation, heat and Laplace equation)
Week 6	Second order partial differential (Bondary condition, Cauchy problem)
Week 7	Mid-term Exam
Week 8	Fourier series
Week 9	Fourier series (sine)
Week 10	Fourier series (cos)
Week 11	Fourier series (cos)
Week 12	separation of variables

Week 13	Fourier transformation
Week 14	Fourier transformation
Week 15	some of applications
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	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Theory and problem of differential equation Frank Ayres JR. 2.Elements of partial differential equation I An Sneddon	Yes
Recommended Texts	مقدمة إلى المعادلات التفاضلية الجزئية، د. عطا الله ثامر العاني	yes
Websites	Internet	

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
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Some applications are added according to Labor market

Course Description Form

University: Mosul **College:** Computer Science and Mathematics **Department:** Mathematics

1. Course name and academic level	
Computational Mathematics I / 3rd Class	
2. Course Code:	
CM MS 25 F 365	
3. Semester / Year:	
Second Semester 2025-2024	
4. Description Preparation Date:	
18/09/2024	
5. Available Attendance Forms:	
Attendance in the classroom and laboratory according to the announced weekly lesson schedule	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 Hours of theory per week / 2 units 2 Hours of practical work per week / 1 unit	
7. Course administrator's name (mention all, if more than one name)	
Dr. Waleed Mohammed Al-Hayani Dr. Ahmed Entesar Ghitheeth Dr. Mahasin Thabet Younis Dr. Mohammed Sabah Mahmoud	waleedalhayani@uomosul.edu.iq ahmed_entesar@uomosul.edu.iq mahasin_thabet@uomosul.edu.iq msmt_math@uomosul.edu.iq
8. Course objectives	
Course Objectives	Teaching the student the Maple program, which is an interactive computational system and a programming language at the same time, so that the student can use it as a programming language capable of solving many of his simple and complex scientific problems in his field of research, as Maple can perform numerical and symbolic solutions to mathematical functions and expressions.
9. Teaching and Learning Strategies	
Strategy	The student obtains sufficient basic information and instructions in the Maple program, so that the student learns and has the ability to create a simple program in Maple.
10. Course Structure	

Week	Hours	Required learning outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Learn the basics of programming	Introduction to Maple: How to download and run Maple.	Presence in the classroom and through practical work in the laboratory with application	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams.
2	4		Basic arithmetic operations, Basic mathematical functions.		
3	4		High School Algebra 1: Floating-point Arithmetic, Evaluate, Factoring a polynomial, Expanding an expression, Collecting like terms, Simplifying an expression.		
4	4		Simplifying radicals, Simplifying rational functions, convert an expression to a different form, Solve equations, Sort, Primes, gcd and lcm.		
5	4		High School Algebra 2: Sequences, Sets, Lists, Summation and producto, The “for” loop with examples.		
6	4		Calculus One Variable: Functions, Limits, Differentiation, Extrema, Taylor, and series expansions.		
7	4		Integration (Integration by Substitution, Integration by parts, Partial fractions).		
8	4		Calculus Multi Variables: Functions, Limits, Partial Derivatives, Implicit derivatives.		
9	4		Multiple integrals (Double integrals, Triple integrals).		
10	4		Graphics 2D: Two-Dimensional Plotting, Parametric Plots, Multiple plots.		
11	4		عطلة العيد		
12	4		Polar plots, Plotting implicit functions, Plotting Points, Title and text in a plot.		
13	4		Mid-Exam		
14	4		Graphics 3D: Three-Dimensional Plotting, Parametric Plots, Multiple plots, Space Curves, Contour Plots.		

15	4		Linear Algebra: Matrices and their types, Vectors and their types.		

11. Course Evaluation and Grade Distribution	
Midterm exam = 30 Degrees. Daily attendance and preparation = 5 Degrees. Practical exam = 15 Degrees. Final exam = 50 Degrees.	
12. Learning and Teaching Resources	
Required textbooks (methodology books if any)	Indeterminate
Main References (Sources)	• Bernard V. Liengme, "Maple", Morgan & Claypool Publishers, (2019). • Frank Garvan, "The Maple Book", Chapman & Hall/CRC, (2002).
Recommended supporting books and references (scientific journals, reports...)	• Martha L. Abell and James P. Braselton, "Maple by Example", 3rd Ed., Elsevier Academic Press, (2005).
Electronic References, Websites	Indeterminate
Curriculum or description update rate	10%

Lecturer Coordinator
Assist. Prof. Dr. Waleed Mohammed Al-Hayani

Head of the Department
Prof. Dr. Abdulghafor Jassim Salim

University: Mosul **College:** Computer Science and Mathematics s **Department:** Mathematics

1. Course Name:	
Financial Mathematics	
2. Course Code:	
CMMS24F367	
3. Semester / Year:	
2nd Semester 2024-2025	
4. Description Preparation Date:	
18/09/2024	
5. Available Attendance Forms:	
Classroom attendance according to the announced weekly class schedule	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 weekly hours / 3 credit units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohammed Omar Al-Amr Email: alamr@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	1. Provide students with the fundamental concepts of simple interest, including its definitions, formulas, and methods of calculation, in addition to the amount's formula, equal payments, debt discounting. 2. Master the concept of periodic interest and its related mathematics, including calculating delay periods and interest, and applying the amount's formula. 3. Explain and simplify the concept of compound interest and its calculation methods, including the compound amount and present value of long-term payments. 4. Enable students to apply financial mathematical concepts and techniques in solving practical problems related to interest. 5. Provide students with the necessary computational and analytical skills to deal with financial problems in fields

	such as investment, and finance.

9. Teaching and Learning Strategies	
Interactive Lectures	Explanation of core concepts with real-world examples
Problem-Based Learning	Solving applied problems in interest calculations, loans, and investm
Practical Exercises	Application of mathematical formulas to real financial data
Continuous Assessment	Short quizzes, weekly assignments, written exam

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Understand simple interest fundamentals and apply its formula	Simple Interest: Definition and Formula	Interactive Lecture	Applied Exercises
2	4	Master simple interest calculation methods	Simple Interest Calculation Methods	Interactive Lecture	Assignments
3	4	Apply short-term equal payment concepts	Short-Term Equal Payments	Interactive Lecture	Applied Exercises
4	4	Understand debt repayment mechanisms	Debt Repayment	Interactive Lecture	Assignments
5	4	Master present value and discount calculations	Present Value and Discount	Interactive Lecture	Short Quiz
6	4	Apply present value concepts to multiple amounts	Present Value for Multiple Amounts	Interactive Lecture	Applied Exercises
7	4	Understand periodic interest fundamentals	Periodic Interest: Definition and Formula	Interactive Lecture	Applied Exercises
8	4	Evaluate acquired knowledge	Midterm Exam	Cumulative Assessment	Written Exam
9	4	Calculate late payment interest	Late Payment Interest	Interactive Lecture	Applied Exercises
10	4	Extract final loan installment	Final Loan Installment Calculation	Interactive Lecture	Assignments
11	4	Understand compound interest fundamentals	Compound Interest: Definition and Formula	Interactive Lecture	Applied Exercises
12	4	Apply compound interest formula	Compound Interest Formula	Interactive Lecture	Practical Evaluation
13	4	Calculate long-term payments	Long-Term Equal Payments	Interactive Lecture	Short Quiz
14	4	Master present value calculations	Present Value with Compound Interest	Interactive Lecture	Applied Exercises
15	4	Discuss practical applications	Applications Discussion	Practical Exercises	Participation Assessment

11.Course Evaluation	
Midterm exam = 30 Degrees. Attendance and preparation = 5 Degrees. Short exam = 5 Degrees. Final exam = 60 Degrees.	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	مقدمة في الرياضيات المالية، 2013، مناضل الجواري، دار اليازوري.
Recommended books and references (scientific journals, reports...)	• An Undergraduate Introduction to Financial Mathematics, 3rd Edition, 2012, J. Robert Buchanan. ○ An Elementary Introduction to Mathematical Finance, 3rd Edition, 2011, Sheldon Ross.
Electronic References, Websites	
Curriculum or description update rate	10%

Lecturer Coordinator
Assist. Prof. Dr. Mohammed Omar Al-Amr

Head of the Department
Prof. Dr. Abdulghafor Jassim Salim

University: Mosul **College:** Computer Science and Mathematics s **Department:** Mathematics

1.Course Name:	
Mathematical Statistics1	
2.Course Code:	
CM MS 25 F 302 SS	
3.Semester / Year:	
Spring semester/ 2024-2025	
4.Description Preparation Date:	
18/9/2024	
5. Available Attendance Forms:	
Attendance in the classroom according to the announced weekly class schedule	
6.Number of Credit Hours (Total) / Number of Units (Total)	
4 hours of theory per the week/ 3 units	
7.Course administrator's name (mention all, if more than one name)	
Name: Email: @uomosul.edu.iq Lecturer: Hanadi Dawood Saleem hanadidawood@uomosul.edu.iq	
8.Course Objectives	
Course Objectives	Learn the basic concepts of mathematical statistics. - Learn about distributions and their importance.

	- Learn about random sampling distributions. - Know the applications of distributions in various sciences. - Learn about the principle of ordered statistics and its distributions

9.Teaching and Learning Strategies

Strategy	The main strategy adopted in delivering this course is to encourage student participation in exercises, while simultaneously improving and expanding their thinking skills. This will be achieved through interactive classroom and tutorials, and by examining challenging issues to motivate students.

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The student learns the Distribution function	Distributions of functions of random variables: Distribution function technique	Attendance in the classroom and through the educational tools available inside the classroom	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, and reports.
2	4	The student learns the Single variable transformation	Distributions of functions of random variables: Single variable transformation technique		
3	4	The student learns the Multivariable transformation	Distributions of functions of random variables: Multivariable transformation technique		
4	4	The student learns about Moment generation function	Distributions of functions of random variables: Moment generation function technique		
5	4	The student learns the mean	Sampling distributions of the mean		
6	4	The student learns populations	Sampling distributions of the mean: Finite populations		
7	4	The student learns Chi-square distribution	Sampling distributions: Chi-square distribution		
8	4	The student learns t-distribution	Sampling distributions: t-distribution		
9	4	The student learns F-distribution	Sampling distributions: F-distribution		
10	4	The student learns Ordered statistics	Sampling distributions: Ordered statistics		
11	4	The student learns about the Central purpose theorem	The purpose of distributions: Central purpose theorem		

12	4	The student learns the concept of Beta distribution	Beta distribution		
13	4	The student learns the concept of simulation	Introduction to simulation		
14	4	The student learns about the Distribution function relationship with simulation	Distribution function relationship with simulation		
15	4	The student learns about the **Jointly** Ordered statistics	**Jointly** Ordered statistics		

11.Course Evaluation	
Assignment and Daily Exams 10% Mid Exam 30% Final Exam 60% Total 100%	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	John E. Freund's Mathematical Statistics with Applicatic Irwin Miller Marylees Miller,2014 1) Introduction to Mathematical Statistics, Robert V Hogg,2019 2) Mathematical Statistics with Applications, D. Wackerly,2008
Main references (sources)	Probability and statistical inference, Robert V. Hogg,202
Recommended books and references (scientific journals, reports…)	Not specified, Only within the specialization of different equations theory and according to the approved course titles
Electronic References, Websites	Not specified, Only within the specialization of differen equations theory and according to the approved cou titles

University: Mosul **College:** Computer Science and Mathematics s **Department:** Mathematics

Course Name:
Mathematical Statistics 2
Course Code:
CM MS 25 F 302 SS
Semester / Year:
Spring semester/ 2024-2025

Description Preparation Date:
18/9/2024
Available Attendance Forms:
Attendance in the classroom according to the announced weekly class schedule
Number of Credit Hours (Total) / Number of Units (Total)
4 hours of theory per the week/ 3 units
Course administrator's name (mention all, if more than one name)
Name: Email: @uomosul.edu.iq Lecturer: Hanadi Dawood Saleem hanadidawood@uomosul.edu.iq
Course Objectives

Course Objectives	• - Learn the basic concepts of mathematical statistics. • - Learn about estimation methods • - Study point estimation and its types • - Learn about the principle of linear regression and analysis variance
Teaching and Learning Strategies	
Strategy	The main strategy adopted in delivering this course is to encourage student participation in exercises, while simultaneously improving and expanding their thinking skills. This will be achieved through interactive classroom and tutorials, and by examining challenging issues to motivate students.

Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The student learns methods of estimation	Point estimation: Unbiasedness	Attendance in the classroom and through the educational tools available inside the classroom	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, and reports.
2	4	The student learns the smallest variance	Point estimation: Efficiency		
3	4	The student learns the convergence of probability	Point estimation: Consistency		
4	4	The student learns about sufficidncy	Point estimation: Adequacy		
5	4	The student learns the types of estimation	Methods of finding an estimator: Method of moments		
6	4	The student learns estimation mathematically	Methods of finding an estimator: Maximum likelihood method		
7	4	The student learns Bayes estimation for samples	Methods of finding an estimator: Bayes estimation		
8	4	The student learns estimates parameter in the interval	Interval estimation: Confidence intervals for means		

9	4	The student learns F-distribution	Interval estimation: Difference between two means		
10	4	The student learns estimates parameter in the interval	Interval estimation: Confidence intervals for variances		
11	4	The student learns estimates parameter in the interval	Interval estimation: Ratio between two variances		
12	4	The student learns the concept of Regression	Regression		
13	4	The student learns the concept of Least squares method	Least squares method		
14	4	The student learns the concept of Correlation	Correlation		
15	4	The student learns about the Regression Applications	Regression Applications		

Course Evaluation	
Assignment and Daily Exams 10% Mid Exam 30% Final Exam 60% Total 100%	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	John E. Freund's Mathematical Statistics with Applications Irwin Miller Marylees Miller,2014 1) Introduction to Mathematical Statistics, Robe V. Hogg,2019 2) Mathematical Statistics with Applications, D. Wackerly,2008
Main references (sources)	Probability and statistical inference, Robert Hogg,2020
Recommended books and references (scientific journals, reports…)	Not specified, Only within the specialization of differential equations theory and according to the approved course titles
Electronic References, Websites	Not specified, Only within the specialization differential equations theory and according to t approved course titles

University: Mosul **College:** Computer Science and Mathematics s **Department:** Mathematics

Course Name:
Theory of Differential Equations
Course Code:
CM MS 25 F 336
Semester / Year:
Spring semester/ 2024-2025

Description Preparation Date:
18/9/2024
Available Attendance Forms:
Attendance in the classroom according to the announced weekly class schedule
Number of Credit Hours (Total) / Number of Units (Total)
4 hours of theory per the week/ 3 units
Course administrator's name (mention all, if more than one name)
Name: D. Thair Younis Tahnoon Email: Thairyounis59@uomosul.edu.iq Lecturer: Merna Adel Aziz merna_samarchi@uomosul.edu.iq
Course Objectives

Course Objectives	• Learning the theoretical concepts of differential equations • Studying the existence and uniqueness theorems for solving differential equations • Understanding the linear independence theorems for solving differential equations • Learning how to solve linear homogeneous differential systems using eigenvalues and eigenvectors • Learning the concept of stability of solutions to differential systems, types of critical points of systems, and the phase plane and the trajectories of these points.
Teaching and Learning Strategies	
Strategy	The main strategy adopted in delivering this course is to encourage student participation in exercises, while simultaneously improving and expanding their thinking skills. This will be achieved through interactive classroom and tutorials, and by examining challenging issues to motivate students.

Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	The student learns the theories of the existence and uniqueness of solutions to differential equations	first order D.Es., the existence of solution theorem (Cauchy – peano th.1)	classroom and through the educational tools available inside the	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly
2	4	The student learns the theories of the existence	Lipschitz condition, the existence and uniqness		

		and uniqueness of solutions to differential equations	solutions theorem (Cauchy – peano th.2)		
3	4	The student learns the approximate methods for finding the solutions for differential equations	fixed point theorem, successive approximations method (Picard method) with examples.		
4	4	The student learns about nth order differential systems and the independence of their solutions.	Systems of n differential equations of first order, linearly independent functions		
5	4	The student learns the theorems of independence and linear dependence of solutions.	Linear independence theorems		
6	4	The student learns how to solve equations of order n with constant coefficients using the method of variation of parameters	Linear differential equation of n th order with constant Coefficient, Variation of parameters to find the solution of higher order D.Es., theorems		
7	4	The student learns how to solve linear homogeneous differential systems.	Linear differential systems, linear homogenous differential systems, Eigen values, Eigen vectors		
8	4		Mid term exam		
9	4	The student learns how to solve linear homogeneous differential systems.	solution for homogenous D.S. distinct Eigen values,		
10	4	The student learns how to solve linear homogeneous differential systems.	solution for homogenous D.S. distinct Eigen values, repeated Eigen values		
11	4	The student learns about the Legander equation and the Bessel equation and how to solve them.	Legendre equation, Bessel equation, method of solution		
12	4	The student learns the concept of oscillation theory and its theorems.	Oscillation theory with theorems		
13	4	The student learns the	The concept of stability, stable		

		concept of stability and critical points of differential systems.	solution, asymptotically stable solution, critical points for systems		
14	4	The student learns about the stability of linear differential systems.	Stability of the critical points for linear systems, roots of characteristic eq. are real and distinct, complex numbers		
15	4	The student learns about the stability of nonlinear systems.	Stability of the critical points for nonlinear systems, linearization method		

Course Evaluation	
Assignment and Daily Exams 10% Mid Exam 30% Final Exam 60% Total 100%	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	نظرية المعادلات التفاضلية، د. احمد زين العابدين محمد، جامعة الموصل، 1992
Main references (sources)	1. Elementary differential equations – Earl D. Rainville and Bedient E , 1990 2. Ordinary Differential Equations, Gabriel Nagy, 2021
Recommended books and references (scientific journals, reports…)	Not specified, Only within the specialization of differential equations theory and according to the approved course titles
Electronic References, Websites	Not specified, Only within the specialization differential equations theory and according to t approved course titles

University: Mosul **College:** Computer Science and Mathematics

Department or Branch: Mathematics

1. Course Name:
Numerical Analysis (2) / 3rd Class
2. Course Code:
MS 306
3. Semester / Year:
1st Semester / 2024 - 2025
4. Description Preparation Date:
18/9/2024
5. Available Attendance Forms:
Classroom according to the announced weekly lesson schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours of theory and 2 hours of practical per week / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ekhlass Saadallah Ahmed/ Professor Email:drekhlass-alrawi@uomosul.edu.iq Name: Dr. Abdulghafor M. Al-Rozbayani/ Professor Email: abdulghafor_rozbayani@uomosul.edu.iq Name: Dr. Mohammed Omar Al-Amr/ Asst. Prof. Email: alamr@uomosul.edu.iq Name: Dr. Raghad Abdul azeez Mustafa Email: raghad.math@uomosul.edu.iq
8. Course Objectives

Course Objectives	• The student's teaching of Numerical Analysis 2 aims at his knowledge of the numerical methods for solving a problem that may be difficult to find an analytical solution. • Study numerical methods to find the numerical integral with their application in solving examples. • Study the error analysis of the approximate solutions of these numerical methods to make it easier for us to know which numerical methods are better in finding the value of numerical integration. • To understand the methods of solving ordinary differential equations numerically with different examples. • To understand the least square approximation ,linear, nonlinear approximation for x and for constants. • Writing algorithms for those numerical methods and programming them using MatLab language practically.

9. Teaching and Learning Strategies

Strategy	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2+2	Learn how to derive formulas for numerical integration methods, solve differential equations, and integrate, while studying errors and writing algorithms for each and program it in MATLAB.	Interpolation polynomial approximation (Lagrange polynomial)	My presence in the classroom and through the educational tools available inside the classroom	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams, and reports.
2	2+2		Newton formulas of finite differences and solving examples		
3	2+2		Numerical integration –derivative of Trapezoidal rule with solving an example and write algorithm		
4	2+2		Derivative of one third Simpson's rule with a study of error analysis and solving an example and write algorithm		
5	2+2		Derivative of 3/8 Simpson's rule and solving an example and write algorithm		
6	2+2		Midpoint Method with solving an example with write a duty-solving example		
7	2+2		Romberg method and solving an example and write algorithm		
8	2+2		Gauss-Legendre with solving different examples		
9	2+2		Closed Newton-Cotes methods with a daily exam		
10	2+2		Mid - course exam		
11	2+2		Derivative of explicit Euler's and implicit Euler's method with solving an example and write algorithm		
12	2+2		Derivative of implicit Euler's method with solving an example and write algorithm		
13	2+2		Taylor series method and solving examples and write algorithm		
14	2+2		Fourth order Runge-Kutta method and solving examples and write algorithm		
15	2+2		Preparatory week before the final Exam		

11. Course Evaluation

Daily attendance and preparation: 10 points Practical: 15 points , Monthly exams: 25 points , Final exam: 50 points	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Ali Muhammad Sadiq Saifi and Ibtisam Kamal Al-Din, Principles of Numerical Analysis, University of Baghdad, 1986.
Main references (sources)	Numerical Methods Using MatLab, fourth edition, John H.M. and Kurtis D.F. :2004
Recommended books and references (scientific journals, reports, ...)	Not specified only includes numerical analysis2 and identifying specific addresses
Electronic References, Websites	Not specified only includes numerical analysis2 and identifying specific addresses
Curriculum or description update rate	10 %

Name and Signature of the Course Instructor	**Name and Signature of the Head of Department or Branch**
Prof. Dr. Ekhlass Saadallah Ahmed Prof. Dr. Abdulghafor M. Al-Rozbayani	Prof. Dr. Abdulghafoor Jasim Salim

1. Course Name:
Operations Research (Third Year)
2. Course Code:
CM MS 24 F 338
3. Semester / Year:
Autumn / 2024-2025
4. Description Preparation Date:
18/9/2024
5. Available Attendance Forms:
Attendance in the classroom according to the announced weekly schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
Four theoretical hours per week / 3 credit hours

7. Course administrator's name (mention all, if more than one name)

Name: Prof. Dr. Ghada Moayid Al-Naemi
Email: drghadaalnaemi@uomosul.edu.iq

8. Course Objectives

Course Objectives	• Determining the minimum or maximum value of a specific function is called the objective function. • The objective of Operations Research is to provide a scientific basis to the decision maker for solving the problems involving the interaction of various components of an organization by employing a team of scientists from various disciplines, all working together for finding a solution which is in the best interest of the organisaton as a whole. The best solution thus obtained is known as optimal decision. • The Operations Research analyst or team of experts first have to examine the situation and clearly define what exactly happening there and identify the variables and constraints. Similarly identify what is the objective and put them all in the form of statement. The statement must include a) a precise description goals or objectives of the study, b) identification of controllable and uncontrollable variables and c) restrictions of the problem. The team should consult the personals at the spot and collect information, if something is beyond their reach, they have to consult duty engineers available and understand the facts and formulate the problem. • The objective of studying Operations Research is to apply scientific and analytical methods to support better and more efficient decision-making, especially in complex environments involving limited resources, multiple variables, and various constraints.

9. Teaching and Learning Strategies

Strategy	This course introduces students to the fundamentals of Operations Research (OR), emphasizing its theoretical foundations and practical applications in decision-making and optimization. The course covers the formulation of mathematical models for real-world problems, particularly linear programming, and explores solution techniques including the Simplex method, Duality Theory, and Sensitivity Analysis. Practical applications such as the transportation problem are also discussed. Students engage in exploratory tasks to foster critical thinking and deepen their understanding of OR principles.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	**Understanding the fundamental concepts** and principles of Operations Research and its role in decision-making.	Introduction, Theoretical models for linear programming problems.	My participation in the classroom and the utilization of electronic platforms	In accordance with the responsibilities assigned to the student, including daily preparation, oral, monthly, and written exams, as well as reports.
2	4	Formulating real-world problems into mathematical models.	Numerical procedures for soling linear programming problems, Graphical method.		
3	4	**Applying optimization techniques** such as linear programming.	Basic and Basic feasible solution. Prime numbers and theorems.		
4	4	The basic and important methods that help in making correct decisions, which are linear programming problems, and some methods for solving linear programming problems and applying them to the transportation problem.	Simplex method (slack variables)		
5	4		Simplex method (artificial variables)		
6	4		Simplex multipliers method.		
7	4		Introduction, Dual method and Dual theorem.		
8	4		Mid Examination.		
9	4		The relationship between the two models solution and what results from them, The inverse basis method.		
10	4		Sensitivity analysis method, Changes in the right side of the constraints, Changes in objective function coefficients.		
11	4		Introduction, Find a primary solution , West corner method, least cost method.		

12	4		Vogle's method, Unbalanced transport problems, Find the optimal solution to the transport problem.		
13	4		Fractional Linear Programming.		
14	4		Methods for solving linear fractional programming Problems.		
15	4		Some methods to solve Methods for solving linear fractional programming problems		

11. Course Evaluation

Daily attendance and participation are worth five points. Daily homework and exam = 5 marks. Monthly exams = 30 marks. Final exam = 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Linear and Nonlinear Programming, 2008 Engineering Optimization Theory and Practice
Main references (sources)	• Introduction to operation research
Recommended books and references (scientific journals, reports…)	• Operation research.
Electronic References, Websites	There are many sources available on scientific platforms, as well as numerous videos and lectures.

1. Course Name:
Number theory (Third Year)
2. Course Code:
CMMS 25 F3 49
3. Semester / Year:
Spring/ 2024-2025
4. Description Preparation Date:
18/9/2024
5. Available Attendance Forms:
Attendance in the classroom according to the announced weekly schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
Four theoretical hours per week / 3 credit hours
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Ghada Moayid Al-Naemi Assist. Prof. Susan H. Mohammad Email: drghadaalnaemi@uomosul.edu.iq
8. Course Objectives

Course Objectives	• The *Number Theory* course aims to introduce students to the concepts of: divisibility, linear congruence, and the law of quadratic reciprocity. • It seeks to familiarize students with the theorems related to this subject, including: Fermat's theorem, the theorem of power residues, exponential functions, and Diophantine equations. • Given the importance of divisibility and the greatest common divisor (GCD) and how to find them, as well as prime numbers, their properties, the fundamental theorem of arithmetic, and its applications, the course also covers what divisibility means and how it is calculated. • Congruence offer an alternative perspective on divisibility by providing an effective tool for facilitating proofs and another means of studying number theory, including properties of congruence, their applications, and methods of solving them. • Complete and reduced residues, linear congruence, and the Chinese Remainder Theorem, along with Euler's and Fermat's theorems and the converse of Fermat's theorem are also

	discussed. • Algebraic congruence: what it means and how it is calculated, numerical functions: their meaning and how to compute them. • Familiarization with residue systems.

9. Teaching and Learning Strategies

Strategy	The course aims to equip students with a thorough understanding of the properties and philosophy of Number Theory. Students will recognize that arithmetic and number theory represent the science that studies the properties of numbers and their various relationships. The teaching approach focuses on core concepts such as divisibility, prime numbers, and congruences, rather than merely memorizing formulas. Each concept will be connected to practical or historical examples to enhance comprehension Simple, progressively challenging examples will be provided to guide students in writing mathematical proofs, especially using mathematical induction and congruence techniques Students will be assigned open-ended problems that require critical thinking and the integration of multiple ideas. Additionally, students will be given hypotheses and exploratory problems to investigate independently, such as observing patterns in modular residues without being provided with the underlying rules directly.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Providing the student with the ability to prove the theorems associated with the prescribed topics, solve mathematical problems related to each topic, provide mathematical examples of all the theorems in the course, and review the history of this course and its affiliation with other mathematics topics.	An introduction and historical overview of number theory, natural and integer numbers, integer characteristics, and basic integer theorems.	My participation in the classroom and the utilization of electronic platforms	In accordance with the responsibilities assigned to the student, including daily preparation, oral, monthly, and written exams, as well as reports.
2	4		The mathematical induction principle, divisibility, basic divisibility properties, the divisibility algorithm theorem, and numerical examples.		
3	4		Greatest common divisor, basic theorems for greatest common divisor, Euclid's algorithm theorem.		

4	4		Prime numbers and theorems.		
5	4		congruencies and their basic theorems.		
6	4		Divisibility of prime numbers and its fundamental theorems.		
7	4		Linear identities, linear identity systems with a variable.		
8	4		Mid Exam		
9	4		Chinese Remainder Theorem.		
10	4		Algebraic matching.		
11	4		Eid al-Fitr holiday.		
12	4		Euler and Fermat's theorems and the inverse of Fermat's theorem.		
13	4		Sediment systems.		
14	4		Reduced sediment system.		
15	4		Numerical functions.		

11. Course Evaluation	Daily attendance and preparation are worth five points. Daily homework and exam = 5 marks.Monthly exams = 30 marks. Final exam = 60 marks.
12. Learning and Teaching Resources	We do not have a prescribed literature.
Required textbooks (curricular books, if any)	نظرية الاعداد، (د.نادر ضبيط)،
Main references (sources)	نظرية الاعداد، (معروف عبد الرحمن)، 2013.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

اسم وتوقيع صاحب المقرر **اسم**

وتوقيع رئيس القسم او الفرع

أ.د. غادة مؤيد النعيمي **أ.د. عبد**

الغفور جاسم سالم

University: Mosul College: Computer Science and Mathematics

Department or Branch: Mathematics

1. Course Name / Class
Mathematical Analysis (1) / 3rd Class
2. Course Code:

CM MS 25 F 331
3. Semester / Year:
1st Semester / 2024 – 2025
4. Description Preparation Date:
18 / 9 / 2024
5. Available Attendance Forms:
Classroom according to the announced weekly lesson schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours per week / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Barah Mahmood Sulaiman Email: barah_mahmood82@uomosul.edu.iq Name: Dr. Salma Muslih Faris Email: salma_muslih67@uomosul.edu.iq
8. Course Objectives

Objectives	– This module aims mathematical analysis aims to introduce the student to the basic concepts and techniques of real analysis. – Exploration of the properties of mathematical numbers: mathematical analysis investigates the properties of real numbers, such as their order, completeness, and algebraic and topological properties. It delves into the structure of the real number system and its various subsets. – Rigorous understanding of calculus: mathematical analysis provides a rigorous foundation for calculus. It aims to give a precise definition of limits, continuity, which are fundamental concepts in calculus. – Study of mathematical functions: mathematical analysis focuses on the behavior and properties of functions defined on the real numbers. – Development of mathematical reasoning and proof-writing skills: mathematical analysis is a discipline that emphasizes rigorous proofs and logical reasoning. It aims to develop students' ability to construct and present mathematical arguments in a precise and coherent manner.

9. Teaching and Learning Strategies

Strategy	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	4	Ability to construct and present rigorous mathematical proofs; Understanding of the properties of real numbers: Students will learn about the order and completeness properties of real numbers, the algebraic structure of real numbers, and the topological properties of real line;	Definition of mathematical analysis with its most important applications	The course will be delivered through in-person lectures held in the Mathematics Department classroom, supplemented by online activities, resources, and assignments provided via the Google Classroom platform.	Students will be evaluated based on their performance in assigned tasks, including daily preparation, participation in daily and oral assessments, monthly and written examinations, and the submission of reports.
2	4		The real numbers, the relationship between the field of rational numbers and the field of real numbers		
3	4		Archimedes property, the set of real numbers, the concept of order, upper and lower bounds		
4	4		The concept of completeness, the complete ordered field, the density of relative numbers, the density of irrational numbers		
5	4	Understanding of fundamental concepts, such as sequences, series, limits, convergence, and continuity;	Real number sequences, convergent sequences, bounded sequences, monotonic sequences, alternating sequences		
6	4		Real number series, types of sequences, convergence of sequences		
7	4		Mid-term Exam + Tests for convergence of infinite series		
8	4	series multiplicati on; apply compactne ss and limits properties; study continuity,	Metric spaces, topological concepts, convergence in metric spaces		
9	4		Absolute and conditional convergence, multiplication of series		

10	4		Compactness, limits of functions and some important theorems in limits		
11	4		Continuity, Continuous maps, Real Continuous maps Space		
12	4		Real maps defined on compact spaces, uniform continuity		
13	4		Mean value property (examples with top applications)		
14	4	and analyze sequences and series of functions with pointwise and uniform convergence	Sequences and series of functions, pointwise convergence and absolute convergence		
15	4		Infinite series of functions, power series		

11. Course Evaluation

Daily attendance and preparation: 2.5 points , Homework: 2.5 points
Daily exams: 5 points , Monthly exams: 30 points , Final exam: 60 points

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Adel Ghassan Naoum, Introduction to Mathematical Analysis, Mosul University Press, 1986
Main references (sources)	Rudin, W., Principles of Mathematical Analysis, 3rd ed., 1976, McGraw-Hill, Inc., New York, USA.
Recommended books and references (scientific journals, reports, ...)	Fusco, N., Marcellini, P., & Sbordone, C., "Mathematical Analysis: Functions of Several Real Variables and Applications", Switzerland: Springer International Publishing, 2024.
Electronic References, Websites	https://en.wikipedia.org/wiki/Mathematical_analysis
Curriculum or description update rate	10 %

Name and Signature of
the Course Instructor

Assist. Prof. Dr. Barah M. Sulaiman
Dr. Salma M. Faris

Name and Signature of
the Head of Department or Branch

Prof. Dr. Abdulghafoor Jasim Salim

University: Mosul **College:** Computer Science and Mathematics
Department or Branch: Mathematics

1. Course Name / Class

Mathematical Analysis (2) / 3rd Class

2. Course Code:

CM MS 25 F 332

3. Semester / Year:

2nd Semester / 2024 - 2025

4. Description Preparation Date:

26 / 04 / 2025

5. Available Attendance Forms:

Classroom according to the announced weekly lesson schedule

6. Number of Credit Hours (Total) / Number of Units (Total)

4 hours per week / 3 units

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Salma Muslih Faris
Email: salma_muslih67@uomosul.edu.iq
Name: Assist. Prof. Dr. Barah Mahmood Sulaiman
Email: barah_mahmood82@uomosul.edu.iq

8. Course Objectives

Course Objectives	– Mathematical analysis aims to introduce the student to the basic concepts and techniques of real analysis. – Understanding Differentiation helps students develop an understanding of how a function's output changes in response to small changes in its input. – Analyzing Extrema: Differentiation enables the identification and analysis of critical points, which include local maxima and minima of a function. – Analyzing Graphs and Behavior: Differentiation provides valuable insights into the behavior of a function's graph. – Approximating Areas: Riemann integration allows us to approximate the area under a curve by dividing the region into smaller rectangles and summing their individual areas. The aim is to obtain a close approximation to the exact area. – Understanding Measurable Sets: Measure theory aims to study measurable sets and their properties. Measurable sets are subsets of a measure space. The aim is to define and characterize measurable sets and explore their properties. – Generalizing Integration: The Lebesgue integral aims to provide a more general and flexible framework for integration compared to the Riemann integral. – Overcoming Riemann's Limitations: The Lebesgue integral aims to overcome the limitations of the Riemann integral, such as the inability to integrate functions with unbounded or discontinuous points.

9. Teaching and Learning Strategies

Strategy	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method

1	4	differentiation, derivatives, and properties of differentiable functions, Apply Fermat's principle, Rolle's theorem, and the mean value theorem, Use L'Hôpital's rule to compute limits, Apply Taylor series and Taylor's theorem to	The differentiation, the derivative, the space of differentiable functions	The course will be delivered through in-person lectures held in the Mathematics Department classroom, supplemented by online activities, resources, and assignments provided via the Google Classroom platform.	Students will be evaluated based on their performance in assigned tasks, including daily preparation, participation in daily and oral assessments, monthly and written examinations, and the submission of reports.
2	4		Fermat's principle, Rolle's theorem, mean value theorem		
3	4		L'Hôpital's law, Taylor series, Taylor's theorem		
4	4	Understand and apply Riemann integration. Analyze continuous and monotonic functions in relation to Riemann integration. Recognize properties of the Riemann integral. Identify Riemann integrable functions.	Riemann integration, definition, examples		
5	4		Relation between continuous, monotonic functions and Riemann integration		
6	4		Riemann integral as a positive non-variance monotonic linear transformation		
7	4		Space of Riemann integrable functions		
8	4	Understand measure theory and measurable functions. Calculate measures of bounded and unbounded sets. Recognize non-measurable and negligible sets and their properties.	Mid-term Exam + Measure Theory, lengths of bounded open intervals,		
9	4		lengths of bounded open sets, Measure of unbounded sets, measurable functions		
10	4		Examples of an unmeasurable set		
11	4		Inner and outer measure of bounded sets, measurable bounded sets.		
12	4		Negligible sets, some important characteristics and theories about negligible sets		
13	4	Define Lebesgue integration with examples. Understand Lebesgue's theorem on Riemann integration and its limitations. Explore key properties of Lebesgue integration. Understand the space of Lebesgue integrable functions.	Define Lebesgue integration with some examples,		
14	4		Lebesgue's theorem of Riemann integration, some weaknesses points of Riemann integration.		
15	4		Some properties of Lebesgue integration, the space of Lebesgue integrable functions		

11. Course Evaluation

Daily attendance and preparation: 2.5 points , Homework: 2.5 points
Daily exams: 5 points , Monthly exams: 30 points , Final exam: 60 points

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Adel Ghassan Naoum, Introduction to Mathematical Analysis, Mosul University Press, 1986

Main references (sources)	Rudin, W., Principles of Mathematical Analysis, 3rd ed., 1976, McGraw-Hill, Inc., New York, USA.
Recommended books and references (scientific journals, reports, ...)	Fusco, N., Marcellini, P., & Sbordone, C., "Mathematical Analysis: Functions of Several Real Variables and Applications", Switzerland: Springer International Publishing, 2024.
Electronic References, Websites	https://en.wikipedia.org/wiki/Mathematical_analysis
Curriculum or description update rate	10 %

Name and Signature of
the Course Instructor

Assist. Prof. Dr. Barah M. Sulaiman
Dr. Salma M. Faris

Name and Signature of
the Head of Department or Branch

Prof. Dr. Abdulghafoor Jasim Salim

Course Description

1. Course Name:
Cryptography
2. Course Code:
CMMS24F456
3. Semester / Year:
2023-2024
4. Description Preparation Date:
1/9/2023
5. Available Attendance Forms:
In classroom of mathematical department
6. Number of Credit Hours (Total) / Number of Units (Total)
4 hours in every week/ 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ban Ahmed Hasan Mitras Email: banah.mitras@uomosul.edu.iq
8. Course Objectives

Course Objectives	* Recognize on cryptography and its algorithms. *Study of classical encryption algorithms. * Study of modern encryption algorithms.
9. Teaching and Learning Strategies	
Strategy	Methods and algorithms of modern and classical cryptography
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		**General definitions**		
2	4		**Transposition Encrypt Algorithm**		
3	4		**Route transposition (zig-zag, anti zig-zag, horizontal, vertical)**		
4	4		**Clock-wise, anti-clock, diagonal route**		
5	4		**Double column transposition algorithm**		
6	4		**Polyliteral Transposition Algorithm**		
7	4		**Substitution Cipher Algorithm**		
8	4		**Direct(Additive) Cipher Algorithm**		
9	4		**Multiplicative Cipher Algorithm**		
10	4		**Affine Cipher Algorithm**		
11	4		**Stream –modern Encrypt Algorithms**		
12	4		**Encrypt Algorithms by ASCCI code**		
13	4		**Mathematical models to cryptography**		
14	4		**Morse Cipher Algorithm**		
15	4		**Beal's homophonic cipher algorithm**		

Course Description

1. Course Name / Class
Dynamical Systems / 4th Class
2. Course Code:
CM MS 24 F 466
3. Semester / Year:

1st Semester / 2023 - 2024

4. Description Preparation Date:

18 / 09 / 2024

5. Available Attendance Forms:

Classroom according to the announced weekly lesson schedule, electronically on Google Classroom platform.

6. Number of Credit Hours (Total) / Number of Units (Total)

4 hours per week / 3 units

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Salma Muslih Faris
Email: salma_muslih67@uomosul.edu.iq

8. Course Objectives

Course Objectives	– Develop the theory of iterative problem-solving and understand the fundamental ideas of dynamical systems. – Understand iterations, fixed points, and periodic points. – Study the basic concepts of dynamical systems. – Explore fundamental theories such as bifurcation theory and chaos theory. – Study dynamical systems in Euclidean and complex settings. – Examine advanced types of chaos (e.g., expanding functions).

9. Teaching and Learning Strategies

Strategy	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	4	Understand the basic concepts of dynamical systems, including fixed points, periodic points, orbits, attraction, and repelling; explore SDIC, density, and topological transitivity; and apply examples and theorems related to these concepts.	Basic Definition of Dynamical Systems (DS): Fixed points, periodic points, orbits, attraction, and repelling.	the Mathematics Department classroom, supplemented by online activities, resources, and	tasks, including daily preparation, participation in daily and oral assessments, monthly
2	4		Study of some examples in DS with special families.		

3	4		Definitions of SDIC (Sensitive Dependence on Initial Conditions), density, and topological transitivity.		
4	4		Examples and theorems related to the above concepts.		
5	4	Understand the concept of bifurcation, identify and distinguish between saddle-node, pitchfork, and Hopf bifurcations, and analyze examples illustrating each type.	Definition of Bifurcation.		
6	4		Study of types of bifurcation: saddle-node / pitchfork bifurcation.		
7	4		Pitchfork bifurcation and Hopf bifurcation.		
8	4		Examples for all the mentioned types of bifurcation.		
9	4	Understand the definition of chaos, recognize key chaotic families such as the logistic and tent maps, explore other chaotic functions, and explain the relationship between bifurcation and chaos.	Definition of Chaos.		
10	4		The most famous chaotic families: logistic map, tent map, etc.		
11	4		Other chaotic functions.		
12	4		The relationship between bifurcation and chaos.		
13	4	Understand dynamical systems in high-dimensional Euclidean spaces, analyze complex dynamical systems including Julia and Fatou sets, and explore the behavior of expanding functions.	Dynamical systems on high-dimensional Euclidean spaces.		
14	4		**Complex dynamical systems** (Julia sets and Fatou sets).		
15	4		Expanding functions.		

11. Course Evaluation

Daily attendance and preparation: 2.5 points , Homework: 2.5 points
Daily exams: 5 points , Monthly exams: 30 points , Final exam: 60 points

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Chaotic dynamical Systems. R.L. Devaney
Main references (sources)	Encountered with Chaos, Gulic.
Recommended books and references (scientific journals, reports, ...)	

Electronic References, Websites	
Curriculum or description update rate	10 %

Course Description Form

University: Mosul **College:** Computer Science and Mathematics **Department:** Mathematics

13.Course name and academic level	
Mathematical Transforms / 4th Class	
14.Course Code:	
CM MS 25 F 437	
15.Semester / Year:	
First Semester 2023-2024	
16.Description Preparation Date:	
1/09/2023	
17.Available Attendance Forms:	
Attendance in the classroom according to the announced weekly class schedule.	
18.Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours of theory per week / 3 units	
19.Course administrator's name (mention all, if more than one name)	
Dr. Waleed Mohammed Al-Hayani Dr. Mohammed Omar Al-Amr	waleedalhayani@uomosul.edu.iq alamr@uomosul.edu.iq
20.Course objectives	

Course Objectives	1. Developing students' problem-solving skills through mathematical transformation techniques. 2. Introducing students to the wide applications of transformations in various scientific fields. 3. Simplifying solutions to complex problems using transformation methods. 4. Strengthening fundamental understanding of concepts and definitions related to mathematical transformations. 5. Training students to use transformations in solving differential equations. 6. Highlighting the importance of transformation methods as a crucial mathematical tool for scientists and researchers.

21. Teaching and Learning Strategies

Interactive Lectures	Explaining fundamental concepts of mathematical transforms with practical examples
Problem-Based Learning (PBL)	Solving real-world problems using mathematical transforms
Collaborative Learning	Group work to solve complex problems using mathematical transforms
Continuous Assessment	Periodic quizzes, weekly assignments, and comprehensive final examination

22. Course Structure

Week	Hours	Required learning outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Learn about the Laplace transform, its properties, and some applications in solving differential equations and integrals.	Introduction and definitions, Kernal, Definition of Laplace integral	Presence in the classroom	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly and written exams.
2	4		Laplace transformation, Properties, Theorems, Examples		
3	4		Laplace Transform of derivatives and integrals, Theorems		
4	4		Inverse transform of Laplace, Method of evaluating inverse		
5	4		Convolution theorem, Properties, Examples		
6	4		Step, Impulse and periodic functions,		
7	4		Mid-term Exam + solving exercises		
8	4		Fourier series, Definitions, Properties		

9	4		Using Properties of sine and cosine		
10	4		Evaluation of Fourier coefficients, Properties, Examples		
11	4		Even and Odd functions, Definitions, principles, Examples		
12	4		Complex form of the Fourier series, Definitions, Examples		
13	4		Z-Transformation, Definitions, Theorems, properties		
14	4		Properties of Z-transform, Theorems, Examples		
15	4		Inverse of Z-transform, Definitions, methods, applications		

23. Course Evaluation and Grade Distribution

Midterm exam = 30 Degrees. Attendance and preparation = 5 Degrees.

Daily exam = 5 Degrees. Final exam = 60 Degrees.

24. Learning and Teaching Resources

Required textbooks (methodology books if any)	Indeterminate
Main References (Sources)	• Ladis, D Kovach, Advance Engineering Mathematics, 5th Edition, Addison Wesley Publishing Com., 2011.
Recommended supporting books and references (scientific journals, reports...)	• Gupta, Parmanand. *Topics in Laplace and Fourier transforms*. Laxmi Publications Pvt Limited, 2019. • Zill, Dennis G., and Michael R. Cullen. Differential equations with boundary-value problems. 7th Edition. Cengage Learning, 2008. • Spiegel, Murray R. *Schaum's Outline of Laplace Transforms*. McGraw Hill Professional, 1965.
Electronic References, Websites	Indeterminate

Curriculum or description update rate	5%

Lecturer Coordinator
Assist. Prof. Dr. Waleed Mohammed Al-Hayani

Head of the Department
Prof. Dr. Abdulghafor Jassim Salim

Course Description

1. Course Name / Class	
Graph Theory / 4th Class	
2. Course Code:	
CMMS 25_F4031	
3. Semester / Year:	
2nd Semester / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Classroom according to the announced weekly lesson schedule	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours per week / 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: ***Dr. Raghad A. Mustafa*** **Email:** raghad.math@uomosul.com ***Lecturer: Asmaa S. Aziz*** smaas982@uomosul.edu.iq	
8. Course Objective	
Course Objective	Identification of graph, directed graph and some special graph. Tracks, paths, and circuits, connected graph, distance in the graph and on the tree, planner graph, and graph immersion are also identified. genus, thickness, number of intersections, and some related results and theorems are identified.

9. Teaching and Learning Strategies	
Strategy	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, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. And knowing the basis of the concepts and where they came from and taking realistic applications on that

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	4	Understand the basic concepts of graph theory.	Introduction to the theory of graphs and its importance to other sciences	The course will be delivered through in-person lectures held in the Mathematics Department classroom, supplemented by online activities, resources, and assignments provided via the Google Classroom platform.	Students will be evaluated based on their performance in assigned tasks, including daily preparation, participation in daily and oral assessments, monthly and written examinations, and the submission of reports.
2	4		Basic Concepts in Graph theory.		
3	4		Directed graphs with some special graphs		
4	4		Connected and distance in graph		
5	4		Trees and forest with some theorems		
6	4	The ability to apply graph theory in different fields.	Planner graph		
7	4		Closed and oriented surfaces		
8	4		Mid-Exam		
9	4		Thickness, genus and number of crosses		
10	4		Kurtovsky's theorem and some		

			theorems		
11	4	students excel in computing, artificial intelligence, statistical analysis, and other	Eid al-Fitr		
12	4		graph coloring		
13	4		Some applications of graph theory		
14	4		Review		
15	4		Final-Exam		

11. Course Evaluation	
Daily exams: 10 points , Monthly exams: 30 points , Final exam: 60 points	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	علي عزيز علي ، " مقدمة في نظرية البيان " وزارة التعليم العالي والبحث العلمي ، الجمهورية العراقي جامعة الموصل 1983.
Main references (sources)	Chartrand , G. and Lesniak , L.; (2016). Graphs and Digraphs,6th ed.,Wadsworth and Brooks/Cole, California
Recommended books and references (scientific journals, reports, ...)	[1].Bondy, J.A. and Murty, U.S.R.; (2008). Graph Theory, Library of Congress Control Number: 2007940370. [2].Diestel , R. . (2005). Graph Theory , Springer – Verlag Heidelberg , New York 2005. [3].Douglas , B. W.; (2002). Introduction in Graph Theory , printed in India by Rashtriya printers. [4].Fournier , J.C. ; (2009). Graph Theory and Applications, John Wiley & Sons, Inc. 111 River Street . USA.
Electronic References, Websites	https://en.wikipedia.org/wiki/Graph_theory
Curriculum or description update rate	10 %

Name and Signature of the Course Instructor	Name and Signature of the Head of Department of Branch
Dr. Raghad Abdulazeez Mustafa	*Prof. Dr. Abdulghafoor J. Salim*

Course Description

1. Course Name:
Function analysis1/ The fourth stage
2. Course Code:
CM MS 21 F 441
3. Semester / Year:
2024-2025
4. Description Preparation Date:
1/10//2025
5. Available Attendance Forms:
Attendance in the classroom according to the announced weekly class schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
Four theoretical lessons per week / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: DR.AHMED AMER ..... Email: ..... :aahmedamer68@uomosul.edu.iq .....
8. Course Objectives

Course Objectives	• Students will study a new spaces, its properties and different type of operators
9. Teaching and Learning Strategies	
Strategy	Vector, normed and Banach spaces Linear, bounded and continuous operators

10. Course Structure

Week	Hours	Required Learning	Unit or subject	Learning	Evaluation

		Outcomes			method
1	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, Examples and some properties of vector spaces**	Learn the methods of evaluating and analyzing the types of roads found in the urban and rural road network and how to determine their capacity and level of service.	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written and reports exams.
2	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Linear combination, span set, linearly independence, finite and infinite dimension,**		
3	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, sum and intersection of subspace, direct summand**		
4	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, Minkowski's inquality, Cauchy Schwartz inequality, some properties of normed spaces**		
5	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Metric space, convergent sequence and Cauchy sequence**		

6	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, The space C[a,b]**		
7	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Open and Closed set, subspace of Banach space**		
8	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Domain, Range of the operator, Null space, differentiation operator , integration operator**		
9	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition , composite of two operators**		
10	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, sylvester's law**		
11	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, Finite dimension Theorem**		
12	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition, continuity and boundedness Theorem**		

13	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition of functional, linear functional, examples**		
14	2	My presence in the classroom and through the educational tools available inside the classroom, with some site visits	**Definition , Theorem**		
15			Definition and some examples		

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.....etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description

1. Course Name:
Function analysis2/ The fourth stage
2. Course Code:
CM MS 22 F 442
3. Semester / Year:
2024-2025 ....
4. Description Preparation Date:
1/10//2025
5. Available Attendance Forms:
Attendance in the classroom according to the announced weekly class schedule
6. Number of Credit Hours (Total) / Number of Units (Total)
Four theoretical lessons per week / 3 units
7. Course administrator's name (mention all, if more than one name)
Name: DR.AHMED AMER Email: :aahmedamer68@uomosul.edu.iq
8. Course Objectives

Course Objectives	• Students will study a new spaces, its properties and different type of operators

9. Teaching and Learning Strategies

Strategy	Inner product space, Hilbert space, orthogonal complements, Representation of functional on Hilbert spaces, Hilbert adjoint operator

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Definition and some examples	**Definition, Examples and some properties of vector spaces**	Learn the methods of evaluating and analyzing the types of roads found in the urban and rural road network and how to determine their capacity and level of service.	According to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written and reports exams.
2	2	Definition and some examples	**Linear combination, span set, linearly independence, finite and infinite dimension,**		
3	2	Some theorem and proposition	**Definition, sum and intersection of subspace, direct summand**		
4	2	Schwarz inequality, parallelogram equality polarization identity	**Definition, Minkowski's inquality, Cauchy Schwartz inequality, some properties of**		

			normed spaces		
5	2	Theorem and Examples	**Metric space, convergent sequence and Cauchy sequence**		
6	2	Orthogonal element to element Orthogonal element to set Orthogonal set to set	**Definition, The space C[a,b]**		
7	2	Definition, examples, theorem	**Open and Closed set, subspace of Banach space**		
8	2	Definition, examples, Gram–schmidt process	**Domain, Range of the operator, Null space, differentiation operator , integration operator**		
9	2	Theorem and Examples	**Definition , composite of two operators**		
10	2	Definition, examples,	**Definition, sylvester's law**		

11	2	Theorem and Examples	**Definition, Finite dimension Theorem**		
12	2	Definition, examples,	**Definition, continuity and boundedness Theorem**		
13	2	Theorem and Examples	**Definition of functional, linear functional, examples**		
14	2	Self adjoint,Unitary ,Normal operators	**Definition , Theorem**		
15	2		Definition and some examples		

11. Course Evaluation

Daily attendance and preparation = 3 marks. Daily homework and exam = 5 marks. Reports = 2 marks. Monthly exams = 30 marks. Final exam = 60 marks.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	