وزارة التعليم العالي والبحث العلمي

جهاز الاشراف والتقويم العلمي

دائرة ضمان الجودة والاعتماد الأكاديمي

قسم الاعتماد

Academic Program and Course Description Guide 2024-2025

University of Mosul

College of Computer Science and Mathematics / Department of Operations Research and Intelligent Techniques

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

Academic Program Description Form

University Name: University of Mosul
Faculty /Institute: Collage of Computer Science and Mathematics
Scientific Department: Department of Operations Research and Intelligent Techniques
Academic or Professional Program Name: Operations Research and Intelligent Techniques
Final Certificate Name: Bachelor Science in Operations Research and Intelligent Techniques
Academic System: Bolonga Process and Courses System
Description Preparation date: 3/12/2024
File Completion Date: 8/12/2024

Signature

Head of Department Name

Assist. Prof. Dr. Niam Abdulmunim Abdulmajeed

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

Date: 5/1/2025

Signature:

Lect.Dr. Ibrahim Mohammad Ahmed

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

Signature:

Approval of the Dean

Prof. Dr. Dhuha Basheer Abdullah Al Bazaz

Date: 5/1/2025

كلية علوم الحاسوب والرياضيات
Quality Assurance
شعبة ضمان الجودة وتقويم الاداء

Academic description

Of computer science and mathematic

1. Educational institution	Mosul
2. Academic Description Program	College of Computer Science and Mathematics
3. Name of the academic program	Operations Research and Intelligent Techniques
4. Name of the final certificate	Bachelor of Science in Operations Research and Intelligent Technologies
5. System	Bologna Pathway System (Levels 1 and 2) Course System (Levels 3 and 4)
6. Accredited accreditation program	Accreditation of Science Majors Programs
7. Date the description was prepared	2025/4/28

Vision of Operations Research and Intelligent Techniques

That the department be a leading center of academic and research excellence, utilizing advanced educational programs and modern technologies to prepare graduates who possess comprehensive knowledge and practical skills, are capable of making effective decisions in various work environments, and contribute to providing the country with highly qualified scientific personnel.

Mission of Operations Research and Intelligent Techniques

The department seeks to provide an academic environment that integrates knowledge between computer science and applied mathematics and to advance students to a high level that enables them to effectively contribute to community service and sustainable development.

Objectives of Operations Research and Intelligent Techniques

1. Achieve cognitive excellence in education and scientific research by adopting advanced educational programs and utilizing modern technologies.

2. Develop students' academic and practical capabilities to enhance their interaction with society and prepare them to contribute to the labor market in accordance with contemporary requirements.

3. Develop students' skills through field training and graduation projects that combine operational research methods and smart technologies, enabling them to participate effectively in community service.

4. Preparing students for postgraduate studies in operations research and intelligent technologies.

5. Encouraging applied research in the fields of sustainable development, renewable energy, and climate change.

6. Preparing specialized scientific and educational cadres capable of interacting with other sciences and contributing to building advanced knowledge integration that serves society.

8. **Objectives of the academic program**

1- Achieving cognitive excellence in education and scientific research by adopting modeling and logical reasoning approaches, and integrating them with interdisciplinary fields.

2- Equipping graduate students with the ability to apply operations research methods and intelligent technologies to develop optimal solutions for challenges faced by both the public and private sectors.

3-Enhancing students' skills in cognitive integration through field training and capstone projects that merge computer science, mathematics, and statistics.

4- Developing students' scientific and practical competencies to strengthen their engagement with society and prepare them to contribute effectively to the Iraqi labor market in line with modern demands.

5- Providing the academic and professional communities with qualified scientific and educational personnel capable of interdisciplinary collaboration and contributing to the development of a knowledge-based economy that serves Iraq.

9. Teaching and learning outcomes

A-Knowledge and understanding

A1- Introducing students to the purpose of teaching this content and the evaluation methods used, why the specific technology was chosen and how it can be used efficiently and effectively. It begins the learning process from easiest to most difficult, and builds on the learner's previous knowledge.

A2- A brief description of the knowledge that should be acquired:

A3- Study and understand the algorithms and data structures that underlie the development of all software

A4- Knowledge of scientific principles that are considered essential in the fields of application of operations research and intelligent technologies

A5- Study and understand models of programming languages and study at least one language from each model

A6- Study a number of specialized fields in computers. (Artificial intelligence, compiler design, database design, computer graphics and software engineering...)

Sufficient knowledge of the theoretical background to continue developing knowledge and skills after graduation, and the ability to read literature and conduct research and graduate studies in the field of specialization.

B - Subject-specific skills

B1 - Suspense and sequence of ideas
B2 - Previous academic level
B3 - Getting to know the latest programs and algorithms
B4- Blended learning by following the YouTube channels of the department's teaching staff and some educational platforms.

C- Thinking skills

C1- Encouraging knowledge contributions to ensure continuous improvement in teaching and scientific research processes and professional performance development
C2- Motivation through financial reward
C3-Honoring
C4- Developing thinking skills by developing alternatives, summarizing, and comparing conclusions.

D- Evaluation methods

D1 - Theoretical and practical tests - Written tests - Evaluation of oral discussions - Evaluation of individual and group assignments (research - Homework - Student reports and projects) - Evaluation of ability to present and deliver.

D2- The ability to design, implement and evaluate computer systems, processes, components and programs to meet required needs.

D3- Presenting real problems, conducting scientific analysis of them, and solving them programmatically through lectures and discussions, following induction and deduction for solution methods.

D4- General and transferable skills (other skills related to employability and personal development).

Teaching and learning methods

1- identify the scientific concepts and principles that will be learned and present them in the form of a question or problem.
2- Preparing the educational materials necessary to implement the lesson.
3- Formulating the problem in the form of sub-questions so that it develops the skill of imposing assumptions among the learners.
4- Determine the activities or exploratory experiences that the learners will carry out.
5- Evaluating learners and helping them apply what they have learned in new situations.
6- Writing reports - preparing research papers
7- Addressing problems and developing appropriate solutions to them on sound scientific foundations

10. Program Structure

Program Structure

Bologna Pathway – Levels 1 and 2

2025-2024

Level 1-1st Corce

S	Subject	Code	Kind of Subject	SSWL (hr/w)					ECTS
				Class	Lecture	Pratical	Tutorail	Total	
1	Operations research (1)	OR101	Core	2	1	2		5	6
2	Calculus (1)	OR102	Core	2	1		2	5	6
3	Programming (1)	OR103	Elective	2	1			3	8
4	Linear Algebra	OR104	Elective	2	1		2	5	6
5	Democracy & Human Rights	UOM1040	Support	1	1			2	2
6	English Language 1	UOM1021	Support	1	1			2	2
Total				10	6	2	4	22	30

Level 1-2nd Corce

S	Subject	Code	Kind of Subject	SSWL (hr/w)					ECTS
				Class	Lecture	Pratical	Tutorail	Total	
1	Operations research (2)	OR107	Core	2	1	2		5	6
2	Calculus (2)	OR108	Core	2	1		2	5	6
3	Programming (2)	OR109	Elective	2	1			3	8
4	Elementary of Statistics	OR110	Elective	2	1		2	5	5
5	Arabic Language 1	UOM1011	Support	1	1			2	2
6	Computer 1	UOM1031	Support	1	1			2	3
Total				10	6	2	4	22	30

Level 2-1st Corce

S	Subject	Code	Kind of Subject	SSWL (hr/w)					ECTS
				Class	Lecture	Pratical	Tutorail	Total	
1	برمجة صحيحة وحركية	OR201	Core	2	1		1	5	5
2	نظرية الاحتمالات (1)	OR202	Core	2	1		2	5	6
3	تحليل عددي (1)	OR203	Elective	2	1	2		5	6
4	مسائل تتابعية	OR204	Core	2	1		1	4	4
5	معادلات تفاضلية	OR205	Elective	2	1		1	4	5
6	جرائم نظام البعث في العراق	UOM2050	Support	1	1			2	2
7	اللغة الإنكليزية 2	UOM2022	Support	1	1			2	2
Total				12	7	2	5	27	30

Level 2-2nd Corce

S	Subject	Code	Kind of Subject	SSWL (hr/w)					ECTS
				Class	Lecture	Pratical	Tutorail	Total	
1	Probability Theory (2)	OR207	Core	2	1		2	5	6
2	Numerical Analysis(2)	OR208	Elective	2	1	2		5	6
3	Assignment Problems	OR209	Core	2	1		1	4	4
4	Reliability Theory	OR210	Elective	2	1		1	4	4
5	Game Theory	OR211	Core	2	1		1	4	5
6	Arabic Language 2	UOM2012	Support	1	1			2	2
7	Computer 2	UOM2032	Support	1	1	1		3	3
Total				12	7	3	5	27	30

Program Structure

Third and Fourth Stages (Course System)

2025-2024

Stage 3 – 1st Corce

S	Subject	Code	Kind of Subject	No. of Hours				No. of Item
				Class	Pratical	Tutorail	Total	
1	Unconstrained Optimization (1)	CMOR24-F3111	Core	3	__	1	4	3
2	Stochastic Processes (1)	CMOR24-F3121	Core	3	__	1	4	3
3	Fuzzy Logic (1)	CMOR24-F3131	Core	3	__	1	4	3
4	Intelligent Techniques (1)	CMOR24-F3141	Elective	2	2	—	4	3
5	Inventory Models (1)	CMOR24-F3151	Core	2	__	1	3	2
6	Regression Analysis (1)	CMOR24-F3161	Core	2	__	1	3	2
7	English Language (3)	CMOR24-F3171	Support	2	__	__	2	2
Total				17	2	5	24	18

Stage 3- 2nd Corce

S	Subject	Code	Kind of Subject	No. of Hours				No. of Item
				Class	Pratical	Tutorail	Total	
1	Unconstrained Optimization (2)	CMOR24-F3211	Core	3	__	1	4	3
2	Stochastic Processes (2)	CMOR24-F3221	Core	3	__	1	4	3
3	Fuzzy Logic (2)	CMOR24-F3231	Core	3	__	1	4	3
4	Intelligent Techniques (2)	CMOR24-F3241	Core	2	2	—	4	3
5	Inventory Models (2)	CMOR24-F3251	Elective	2	__	1	3	2
6	Regression Analysis (2)	CMOR24-F3261	Elective	2	__	1	3	2
7	Decision Theory	CMOR24-F3271	Core	2	__	1	3	2
Total				17	2	6	25	18

Stage 4 - 1st Corce

S	Subject	Code	Kind of Subject	No. of Hours				No. of Item
				Class	Pratical	Tutorail	Total	
1	Constrained Optimization (1)	CMOR24-F4111	Core	3	—	1	4	3
2	Queuing Theory (1)	CMOR24-F4121	Core	3	—	1	4	3
3	Neural Networks (1)	CMOR24-F4131	Core	3	—	1	4	3
4	Modeling	CMOR24-F4141	Core	2	2	—	4	3
5	Pattern Recognition	CMOR24-F4151	Elective	2	—	1	3	2
6	Scientific Search Method	CMOR24-F4161	Support	2	—	—	2	2
Total				15	2	4	21	16

Stage 4 – 2nd Corce

S	Subject	Code	Kind of Subject	No. of Hours				No. of Item
				Class	Pratical	Tutorail	Total	
1	Constrained Optimization (2)	CMOR24-F4211	Core	3	—	1	4	3
2	Queuing Theory (2)	CMOR24-F4221	Core	3	—	1	4	3
3	Neural Networks (2)	CMOR24-F4231	Core	3	—	1	4	3
4	Modeling	CMOR24-F4241	Core	2	2	—	4	3
5	English Language (4)	CMOR24-F4151	Support	2	—	—	2	2
6	Reliability Theory	CMOR24-F4161	Elective	2	—	1	3	2
7	Search Project	CMOR24-F4271	Elective	—	4	—	4	2
Total				15	6	4	25	18

Curricular Skills Mapping																			
Please check the boxes corresponding to the individual learning outcomes from the program that are being assessed																			
			Program Learning Outcomes (PLOs)																
Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills				Generic and Transferable Skills			
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage 1 Course 1	Operations research (1)	OR101	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Calculus (1)	OR102	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage 1 Course 1	Programming (1)	OR103	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Linear Algebra	OR104	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage 1 Course 1	Democracy & Human Rights	UOM1040	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	English Language 1	UOM1021	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills				Generic and Transferable Skills			
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage 1 Course 2	Operations research (2)	OR107	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Calculus (2)	OR108	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage 1 Course 2	Programming (2)	OR109	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Elementary of Statistics	OR110	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage 1 Course 2	Arabic Language 1	UOM1011	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Computer 1	UOM1031	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills				Generic and Transferable Skills			
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage2 Course 1	Integer and Dynamic Programming	OR201	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Probability Theory (1)	OR202	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 1	Numerical Analysis (1)	OR203	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Sequencing Problems	OR204	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 1	Differential Equations	OR205	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Crimes of the Baath Regime in Iraq	UOM2050	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 1	English Language 2	UOM2022	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Stage2 Course 2	Probability Theory (2)	OR207	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Numerical Analysis (2)	OR208	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 2	Assignment Problems	OR209	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Reliability Theory	OR210	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 2	Game Theory	OR211	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Arabic Language 2	UOM2012	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage2 Course 2	Computer 2	UOM2032	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage3 Course 1	Unconstrained Optimization (1)	CMOR24-F3111	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Stochastic Processes (1)	CMOR24-F3121	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course 1	Fuzzy Logic (1)	CMOR24-F3131	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Intelligent Techniques (1)	CMOR24-F3141	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course 1	Inventory Models (1)	CMOR24-F3151	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Regression Analysis (1)	CMOR24-F3161	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course 1	English Language (3)	CMOR23-F3171	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Curricular Skills Mapping																			

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Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills				Generic and Transferable Skills			
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage3 Course 2	Unconstrained Optimization (2)	CMOR24-F3211	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Stochastic Processes (2)	CMOR24-F3221	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course2	Fuzzy Logic (2)	CMOR24-F3231	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Intelligent Techniques (2)	CMOR24-F3241	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course 2	Inventory Models (2)	CMOR24-F3251	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Regression Analysis (2)	CMOR24-F3261	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage3 Course 2	Decision Theory	CMOR23-F3271	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills						Generic and Transferable Skills	
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage4 Course 1	Constrained Optimization (1)	CMOR24-F4111	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Queuing Theory (1)	CMOR24-F4121	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 1	Neural Networks (1)	CMOR24-F4131	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Modeling	CMOR24-F4141	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 1	Pattern Recognition	CMOR24-F4151	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 1	Scientific Search Method	CMOR24-F4171	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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Please check the boxes corresponding to the individual learning outcomes from the program that are being assessed																			
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Year / Level	Name Title	Code	Knowledge and understanding						Subject-specific skills				Thinking skills				Generic and Transferable Skills			
			A1	A2	A3	A4	A5	6A	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Stage4 Course 2	Constrained Optimization (2)	CMOR24-F4111	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Queuing Theory (2)	CMOR24-F4121	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 2	Neural Networks (2)	CMOR24-F4131	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Modelling	CMOR24-F4141	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 2	Pattern Recognition	CMOR24-F4151	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Reliability Theory	CMOR24-F4161	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Stage4 Course 2	Search Project	CMOR24-F4161	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Course Description

First Level / Bologna Process

2024-2025

Semester One

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Operations Research (1)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR101**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	OR408		**College**	UoM	
Module Leader	Oday Abdulrahman Jarjies		**e-mail**	odayjarjies@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Ghazwan Alsoufi		**e-mail**	ghazwan.alsoufi@uomosul.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/02/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Operations Research (1)	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and an understanding of operations research through applying formulas to solve some examples. 2. Use mathematical and engineering methods to study optimization problems in Business and Management, Economics, Computer Science, Civil Engineering, Industrial Engineering, etc.

	3. This course introduces frameworks and ideas about various types of optimization problems in the business world. 4. In particular, we focus on how to formulate real business problems into mathematical models that can be solved by computers.
Module Learning Outcomes	1. Fundamentals of operations research and development 2. Scientific methods in operations research 3. Operations research and its relationship to decision-making 4. Linear programming of the general form 5. Building linear programming models 6. The canonical and standard form of linear programming 7. Simplex method 8. Special cases in linear programming 9. Graphical Method 10. Big M method 11. Two Phaes Method 12. Corresponding(dual) model

	13. The relationship between the normal and the corresponding model 14. The corresponding(dual) optimal solution 15. The corresponding(dual) simplex method
Indicative Contents	Indicative content includes the following. <u>Part A- Components of Linear Programming [10 hrs]</u> The basic components of the LP are as follows: • Decision Variables • Constraints • Data • Objective Functions <u>Part B- Characteristics of Linear Programming</u> [15 hrs] • The following are the five characteristics of the linear programming problem: • Constraints – The limitations should be expressed in the mathematical form, regarding the resource. • Objective Function – In a problem, the objective function should be specified in a quantitative way. • Linearity – The relationship between two or more variables in the function must be linear. It means that the degree of the variable is one. • Finiteness – There should be finite and infinite input and output numbers. In case, if the function has infinite factors, the optimal solution is not feasible. • Non-negativity – The variable value should be positive or zero. It should not be a negative value. • Decision Variables – The decision variable will decide the output. It gives the ultimate solution of the problem. For any problem, the first step is to identify the decision variables. <u>Part C-Methods to Solve Linear Programming Problems [25 hrs]</u> • The linear programming problem can be solved using different methods, such as the graphical method, simplex method, or by using tools such as WINQSB, LINGO, QMP, open solver etc. Here, we will

	discuss the two most important techniques called the simplex method ,graphical method, Big M method, Two Phaes Method in detail. Part D- Special Cases in Graphical Method: Linear Programming [10 hrs] • The linear programming problems (LPP) discussed in the previous section possessed unique solutions. This was because the optimal value occurred at one of the extreme points (corner points). But situations may arise, when the optimal solution obtained is not unique. Part E- Corresponding(dual) model [15 hrs] • The relationship between the normal and the corresponding model • The corresponding(dual) optimal solution • The corresponding(dual) simplex method

Learning and Teaching Strategies

Strategies	basic form of programmed instruction—called linear programming—analyzes a subject into its component parts and arranges the parts in sequential learning order. At each step in their reading, students are required to make a response and are told immediately whether or not the response is correct.

Student Workload (SWL)

Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	4 and 10	LO #1- #4 and #9-#12
	Assignments	1	10% (10)	5	LO #1- #4

	Report	1	10% (10)	13	LO #1- #12
Summative assessment	**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)

	Material Covered
Week 1	Fundamentals of operations research and development
Week 2	Scientific methods in operations research
Week 3	Operations research and its relationship to decision-making
Week 4	Linear programming of the general form and The canonical and standard form of linear programming
Week 5	Building linear programming models
Week 6	Graphical Method
Week 7	Simplex method
Week 8	Numerical examples
Week 9	Special cases in linear programming
Week 10	Big M method
Week 11	Two Phaes Method
Week 12	Numerical examples
Week 13	Corresponding(dual) model
Week 14	The relationship between the primal and the dual model
Week 15	The corresponding(dual) optimal solution and The corresponding(dual) simplex method
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	حمدي طه	Yes
Recommended Texts	1-مقدمة في نماذج البرمجة الخطية بين النظرية والتطبيق , سعد النعيمي. 2-بحوث العمليات , احمد حاتم عبدالله	No
Websites	https://www.tutorialsduniya.com/notes/linear-programming-applications-notes/	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 – 100	Outstanding Performance
	B - Very Good	**Very good**	80 – 89	Above average with some errors
	C – Good	**good**	70 – 79	Sound work with notable errors
	D - Satisfactory	**median**	60 – 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Calculus (1)**			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Tutorial** ☐ **Lab** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR102**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**UGI**	**Semester of Delivery**		1
Administering Department		OR	**College**	CSM	
Module Leader	Edrees M. Nori Mahmood		**e-mail**	edreesnori@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Ahmed Naziyah Abdullah		**e-mail**	Ahmed.alkhateeb@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		26/01/2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	Calculus (2)	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop basic mathematical skills necessary for all branches of mathematics. 2. To develop the ability to think in mathematical analysis to solve problems. 3. Introduce the student to the relationship between limits, continuity and derivatives. 4. To learn the rules of differentiation and its applications. 5. To develop the ability to draw curves by making use of all the information that has been studied. 6. To learn the basic rules of integration and its applications.
Module Learning Outcomes	1. Understanding different types of algebraic functions and how to identify them. Also, learn the different identities of algebraic functions.

	2. Understanding limits and their relationship to continuity. 3. Understanding the concept of continuity and its relationship to differentiation. 4. The ability to understand differentiation and its rules. 5. Understand the consequences of Rolle's theorem and the Mean Value theorem for differentiable functions. 6. The ability to understand integration and its rules. 7. Employing all the concepts studied in drawing curves and solving mathematical problems.
Indicative Contents	Indicative content includes the following. Sets, set representation, real numbers, intervals and their types. [5 hrs] Cartesian coordinate system and some basic concepts in analytic geometry. [5 hrs] Algebraic functions, domain, range, algebraic operations on functions. [10 hrs] Limits. [5 hrs] continuity. [5 hrs] derivatives. [15 hrs] L'Hôpital's first and second rule. [5 hrs] Rolle's theorem, mean value theorem. [5 hrs] Applications of derivatives. [5 hrs] Integration. [10 hrs] Applications of definite integration. [5 hrs]

Learning and Teaching Strategies	
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 types of simple experiments involving some sampling activities that are interesting to the students.
Student Workload (SWL)	

For 15 weeks			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #3, #4
	Assignments	2	10% (10)	2 and 12	LO #1, #2, #3 and #4, #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2, #3 and #4, #5
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)

	Material Covered
Week 1	Sets, set representation, Real numbers, intervals and their types.
Week 2	Linear and nonlinear inequalities.

Week 3	Cartesian coordinate system and some basic concepts in analytic geometry.
Week 4	Function, types of functions, domain and range of function, graph of function.
Week 5	Algebraic operations on functions, composition of functions, inverse of functions.
Week 6	limits: definition of limit, theorems in limits, computing limits, limits on one side, infinite limits, limits at infinity.
Week 7	The concept of continuity, theorems in continuity, continuity at a point, continuity on an interval.
Week 8	Derivatives: definition, derivative rules, higher order derivatives.
Week 9	Chain rule
Week 10	Implicit functions and their derivatives.
Week 11	L'Hôpital's first and second rule.
Week 12	Rolle's theorem, mean value theorem.
Week 13	Applications of derivatives: increasing functions, decreasing functions, maximum and minimum values of a function.
Week 14	Integration, integration rules, definite integral, the Fundamental Theorem of Calculus.
Week 15	Applications of definite integral in finding the area.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

Week 6	
Week 7	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	مبادئ الرياضيات التفاضل والتكامل للدكتور علي عزيز علي واخرون، 1980 التفاضل والتكامل د. رمضان محمد جهيمة و د. أحمد عبد العالي، 2002 الجزء الأول.	yes
Recommended Texts	Thomas Calculus Schaum's calculus series Calculus of one and several Variaables,11th Edition	yes
Websites	https://www.khanacademy.org/math/calculus-1 https://tutorial.math.lamar.edu/classes/calci/calci.aspx	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Programming (1)**			**Module Delivery**	
Module Type	**Basic**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**OR103**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**UGI**	**Semester of Delivery**	**1**		
Administering Department	**OR**	**College**	**CSM**		
Module Leader	كرم عادل عبد	**e-mail**	karamadel@uomosul.edu.iq		
Module Leader's Acad. Title	**lecture**	**Module Leader's Qualification**	ماجستير		
Module Tutor	كرم عادل عبد	**e-mail**	karamadel@uomosul.edu.iq		
Peer Reviewer Name	احمد نزيه	**e-mail**			
Scientific Committee Approval Date	**2025/1/24**	**Version Number**	**1.0**		

Relation with other Modules			
Prerequisite module	Programming (1)	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To enhance problem-solving skills and general programming understanding through the application of the MATLAB language. 2. This course focuses on the fundamental concepts of programming using the MATLAB language. 3. It serves as the foundational subject for all types of programming. 4. To comprehend programming challenges and develop solutions utilizing the MATLAB language.
Module Learning Outcomes	In MATLAB, an array can produce multiple outputs based on its usage and the operations applied to it. Below are some common outputs of arrays in MATLAB:

	"Here are some common outputs of conditional statements such as if and while in MATLAB: 1. **Logical values**: In if and while statements, the result can be either true or false, which determines whether the code inside the conditional statement will be executed or not. 2. **Multiple actions**: If the conditional statement contains more than one condition, different actions may be executed depending on the satisfaction of the multiple conditions. 3. **Text output**: disp or fprintf can be used to print messages that clarify the result of the condition or the status within the conditional statements. 4. **Repetition of actions**: Using while, a certain process can be repeated as long as the condition remains true, with the output potentially changing depending on the iteration. 5. **Stopping operations**: The break statement can be used inside a while loop to stop the loop when a certain condition is met, causing an early exit from the loop. 6. **Re-executing operations**: Sometimes, continue is used to skip the current iteration and proceed to the next iteration within a while or for loop. 7. **Returning values to variables**: Conditional statements can return values to variables based on the outcome of the condition, such as returning a specific value if a certain condition is met. 8. **Transition points**: If the conditional statements include else or elseif, multiple paths may be executed depending on the satisfaction of the conditions. 9. **Complex mathematical operations**: Within if statements, complex calculations or mathematical functions may be executed based on specific conditions. 10. **Exiting using return**: In if statements within functions, return can be used to exit the function if the condition is met. 11. **Multiple outputs within functions**: When using conditional statements within a function, the outputs may be multiple values or notifications depending on the logic of the condition."
Indicative Contents	"The instructional content for MATLAB can be divided into several categories, including: 1. **Basics**: This content includes an introduction to the MATLAB graphical interface (MATLAB Desktop) and the tools used in program development, as well as an overview of the basic commands in the language. 2. **Programming Concepts**: The guidance should include important programming concepts, such as conditionals, loops, arrays, and data handling.

	3. **Graphing**: The guidance should explain how to plot data using MATLAB, such as line plots, pie charts, and 3D plots. 4. **Statistics and Data Analysis**: The guidance could include an explanation of how to use MATLAB for data analysis and performing statistical operations, such as solving differential equations, factor analysis, and classification. 5. **Machine Learning**: The guidance may also cover how to use MATLAB to develop machine learning models, such as classification, clustering, and factor analysis models. 6. **Matrices and Vectors**: Defining and creating matrices and how to work with them in MATLAB. 7. **Charts and Plots**: Methods for plotting different types of charts, such as line charts and polar plots. 8. **Matrices and Vectors**: Defining and creating matrices and how to work with them in MATLAB. In general, the guidance should include examples and practical exercises that allow users to apply the concepts and tools explained in real-world scenarios. [90 h]"

Learning and Teaching Strategies	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to use the MATLAB language and then 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) For 15 weeks			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7

Total SWL (h/sem)	200

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	A general introduction to MATLAB.
Week 2	Basics of writing in MATLAB.
Week 3	Variables and constants in MATLAB.
Week 4	Operator precedence in MATLAB.
Week 5	Algorithms in MATLAB.
Week 6	Flowcharts in MATLAB.

Week 7	Programming statements in MATLAB.
Week 8	The conditional **if** statement has three forms.
Week 9	The **for**-loop statement.
Week 10	The **while** loop statement.
Week 11	The **break** statement.
Week 12	The **continue** statement.
Week 13	A general introduction to arrays.
Week 14	Integrating programming statements with arrays.
Week 15	General exercises and review.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: General introduction to arrays
Week 2	Lab 2: Entering and addressing arrays
Week 3	Lab 3: types of arrays
Week 4	Lab 4: operations on arrays
Week 5	Lab 5: Solve various examples of matrices
Week 6	Lab 6: Solve various examples of matrices using the conditional "if" and "for" statements
Week 7	Lab 7: Functions ready with (special) matrices
Week 8	Lab 8: Generating Matrices
Week 9	Lab 9: Rotate and reshape the matrix

Week 10	Lab 10: Expanding Matrices
Week 11	Lab 11: Partial matrices
Week 12	Lab 12: Changing matrix elements
Week 13	Lab 13: Drawing in MATLAB in two dimensions
Week 14	Lab 14: Drawing in MATLAB in three dimensions
Week 15	Lab 15: General review

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1- محمد رفيق علي ," تطبيقات الماتلاب الهندسية ", جامعة البلقاء التطبيقية, 2010 .	Yes
Recommended Texts	The MathWorks, Inc., MATLAB®13 Help, 2020	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria

Fail Group **(0 – 49)**	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Linear algebra**			**Module Delivery**	
Module Type	**Basic**			☒ Theory ☒ Lecture ☐Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**OR104**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**UGI**	**Semester of Delivery**		**1**
Administering Department		**OR**	**College**	**CSM**	
Module Leader	هدى عصام احمد		**e-mail**	Dr.hudaea@uomosul.edu.iq	
Module Leader's Acad. Title		**Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	حذيفة حازم طه		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		**1/02/2025**	**Version Number**		**1.0**

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Providing the student with sufficient information that qualifies him to distinguish realistic situations that can be solved by matrix algebra.

	2- Accustoming the student to formulating realistic problems as models in linear algebra. 3- Solving a system of linear equations using linear algebra. 4-To develop students' skills in understanding matrices and arithmetic operations on matrices. 5- Study linear algebra in detail.
Module Learning Outcomes	1- Matrices and arithmetic operations 2-Finding the inverse of matrices (using elementary transformations - Gaussian elimination) 3- Learn to find the determinant of matrices with small and very large capacities (definition method - modern method - discriminant factor method - elementary transformation method). 4- Solving the non-homogeneous linear system using matrices in the case m=n (Cramer's method - definition method - Gauss's elimination method to find the inverse and solve the system) 5-Solving a non-homogeneous linear system using matrices if the number of equations is less than the number of unknowns 6- Solve the non-homogeneous linear system using matrices if the number of equations is greater than the number of unknowns 7- How to find the rank of square and non-square matrices 8-Using the diacritic formula and how to find the rank of square and non-square matrices

	-9 Euclidean nth space (Euclidean length - Euclidean distance - Euclidean multiplication - Dicatric multiplication)
Indicative Contents	Instructional content includes the following. Part A – Matrices Basic concepts and definition of matrices and their types - Arithmetic operations on matrices (addition, subtraction, multiplication) and the properties of those operations - The effect of the matrix and its applications in arithmetic operations - Complex numbers and arithmetic operations on them with their properties - Complex numbers and arithmetic operations on them with their properties - Complex numbers and arithmetic operations on them With its properties- Finding determinants of large capacity matrices - Properties of determinants - Inverses of matrices (using elementary transformations - Gaussian elimination) - Properties of inverses of matrices - Methods of solving systems of non-homogeneous linear equations using the method of Gauss, Gauss-Gordon and Kramer, when the determinant of the matrix is not equal to zero - Equivalent matrices and types of solution to equations Linearity - finding the order of matrices using equivalence - the modal or suppressive formula - defining the nth Euclidean space and some of its theorems - defining the linear structure, the Euclidean length, and the Euclidean distance between two vectors in the nth Euclidean space - finding the characteristic roots and characteristic vectors [75 hours]

Learning and Teaching Strategies

Strategies	Encourage students to participate in exercises, while improving and expanding critical thinking skills at the same time. 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) **For 15 weeks**			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation					
		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
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Basic concepts and definition of matrices and their types, arithmetic operations on matrices (addition, subtraction, multiplication) and properties of those operations, the effect of the matrix and its applications in arithmetic operations.
Week 2	Complex numbers and arithmetic operations on them with their properties - Complex numbers and arithmetic operations on them with their properties - Complex numbers and arithmetic operations on them with their properties
Week 3	Finding determinants of small capacity matrices
Week 4	Finding the determinants of large capacity matrices - (definition - modern method - discriminant factor method - elementary transformations method).
Week 5	Properties of determinants
Week 6	- Inverse of matrices (using elementary transformations - Gaussian elimination)
Week 7	Properties of inverse matrices-

Week 8	Solving a non-homogeneous linear system using matrices in the case m=n (Cramer's method - definition method - Chaos' elimination method to find the inverse and solve the system)
Week 9	Chaos' elimination method to find the inverse and solve the system
Week 10	Solving a non-homogeneous linear system using matrices if the number of equations is less than the number of unknowns
Week 11	Solving a non-homogeneous linear system using matrices if the number of equations is greater than the number of unknowns
Week 12	- How to find the rank of square and non-square matrices
Week 13	The diacritic formula - The diacritic formula and how to find the rank of square and non-square matrices
Week 14	Nth Euclidean space (Euclidean length - Euclidean distance - Euclidean multiplication - Dicatric multiplication)
Week 15	Definition of linear structure - finding characteristic roots and characteristic vectors
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

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

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**حمزة, د.لميعة goodالجبرالخطي تأليف (د.عبدالم باقرالجواد)** **الخطي الخبر وتطبيقاته تأليف د. معروف الرحمن**	Yes
Recommended Texts	الجبر الخطي تاليف د. جورج ضايق السبتي(١٩٨٨)	No
Websites	https://youtu.be/ettlYWO0zlg?si=fluQnZKfax7RWWaJ	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performanceأداء مذهل
	B - Very Good	**Very good**	80 - 89	Above average with some errors median

	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group **(0 – 49)**	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information

Module Title	Democracy & Human Rights	**Module Delivery**	
Module Type	Support	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOM1040		
ECTS Credits	2		
SWL (hr/sem)	30		
Module Level	UGI	**Semester of Delivery**	1
Administering Department	STAT	**College**	CSM
Module Leader	Fidaa Ziyad Hasan	**e-mail**	Fidaa-law@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	MSc.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	10/06/2023	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Encourage students to participate objectively in dialogue in a manner consistent with the ethics of Arab society. 2. Clarify the concepts and terminology of human rights and democracy to students and familiarize them with them. 3. Explain and simplify universal declarations, international conventions, and the political system's position on this topic. 4. Accustom students to working in their environment in the field of human rights and familiarize them with global experiences in this field. 5. Train students to uncover and document human rights violations without bias and according to a scientific approach, as much as possible. Instill the idea of accepting others, respecting their opinions, and respecting pluralism in the political system, while eradicating the tendency toward exclusion and marginalization of dissenting opinions.
Module Learning Outcome	1. Introducing students to human rights and fundamental freedoms, as well as the basic principles of democracy. 2. Enabling students to effectively exercise their rights through comprehensive personal development, a sense of dignity, and respect for the rights and fundamental freedoms of others, in accordance with the values of a democratic society. 3. Enabling students to positively influence others in a manner consistent with human rights principles. 4. Consolidating theoretical knowledge in the student's mind by linking this knowledge to current social, political, and economic events and phenomena, to achieve the desired goal of teaching this subject. When the concept of democracy is introduced to students, the concepts of freedom, justice in rights and duties, and a peaceful social life, where the rule of law prevails, equality of citizens, and other concepts and practices that express respect for human rights and citizens regardless of their ideology, color, or affiliation, immediately come to mind. This also develops students' understanding of political rights and their practice, reflecting this in their social and political lives. It also develops students' political intellectual development in distinguishing political systems and methods of political governance.
Indicative Contents	The guiding content includes the following: Part A - Basic Concepts of Human Rights: The nature of human rights, their definition, types, contents, importance, characteristics, features, categories, and standards. [20 hours] Part B - Duties: Duties imposed on the exercise of human rights and restrictions thereon. [20 hours]

	Part C - Human Rights Guarantees: International criminal guarantees for the protection of human rights (substantive - procedural). Human rights violations - drugs - cyber extortion - cyber fraud - genocide. [35 hours]

Learning and Teaching Strategies	
Strategies	1. Human rights strategies revolve around three main issues: 2. The general strategy: Introducing university students to the nature of human rights from global, humanitarian, scientific, and religious perspectives, and in an objective manner, free from political, intellectual, and sectarian influences, etc. 3. The specific strategy is to seek to bring about a change in the student's behavior in line with the general goal by directing attention to the true content of human rights and their legal dimensions, studying international declarations and conventions, and the impact of blatant violations of these norms that affect people's lives or dignity, especially since human rights are comprehensive and apply to all human societies. Specific strategies in democracy revolve around two issues: 1. The general strategy: Introducing university students to the nature of the democratic system from global, humanitarian, scientific, and religious perspectives, and in an objective manner, free from the importance of political and intellectual influences on the mechanism and functioning of the political system and the independence of political governance. 2. The specific strategy is to seek to bring about a change in the student's way of thinking in line with the general goal by directing attention to the true content of the democratic system and its benefits, which will be reflected in the economic and social spheres, as well as the importance of the role of the general will in Steering the course of government through the exercise of political rights.

Student Workload (SWL) For 15 Weeks			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1

Total SWL (h/sem)	50

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	(What are human rights), definition, types, contents of human rights,
Week 2	(What are human rights), importance, characteristics, features, categories, standards
Week 3	Stages of development of human rights, historical and modern
Week 4	Characteristics of basic human rights (freedom and equality) (freedom)
Week 5	Characteristics of basic human rights (freedom and equality) (equality)
Week 6	Rights of some special groups under international law (children, women, patients, prisoners, prisoners of war)
Week 7	Rights of some special groups under international law (children, women, patients, prisoners, prisoners of war)
Week 8	Rights of some special groups under international law (children, women, patients, prisoners, prisoners of war)

Week 9	General guarantees of human rights in national and international law - national law
Week 10	General Guarantees of Human Rights in National and International Law - International Law
Week 11	The emergence of democracy and the nature of democratic governance
Week 12	Principles and pillars of democratic governance and characteristics of democratic governance
Week 13	Types of democratic rule (direct, semi-direct, indirect)
Week 14	Types of democratic rule (direct, semi-direct, indirect)
Week 15	Political rights of the individual within the framework of the democratic system and their types
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	حقوق الانسان والديمقراطية في القانون الدولي للمؤلف د. محمد يونس الصايغ	Yes
Recommended Texts	حقوق الانسان والديمقراطية للمؤلف د. حميد حنون خالد حقوق الانسان للمؤلف رياض عزيز هادي حقوق الانسان للمؤلف والديمقراطية د.ماهر صبري كاظم المركز القانوني للطفل في القانون الدولي د. فاطمة شحاته زيدان القانون الدولي الانساني د. نزار العنبكي	
Websites	المصادر الدولية لحقوق الانسان: 1. الإعلان العالمي لحقوق الانسان عام 1948. 2. العهدان الدوليان الخاصان بحقوق الانسان: أ- العهد الدولي الخاص بالحقوق السياسية والمدنية. ب. العهد الدولي الخاص بالحقوق الخاص بالحقوق الاجتماعية والاقتصادية والثقافية	

Grading Scheme

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	**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.

MODULE DESCRIPTION FORM

Module Information					
Module Title	English Language			**Module Delivery**	
Module Type	Support			☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	UOM1021				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	OR		**College**	CSM	
Module Leader	Zainab Qusay Ahmed Taqi		**e-mail**	Zainab.q@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. lecturer		**Module Leader's Qualification**	master	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	23/01/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To be able to speak English fluently and accurately. 2. To think in English and then speak. 3. To be able to compose freely and independently in speech and writing. 4. To be able to read books with understanding.
Module Learning Outcomes	1. To address grammar issues that students encounter in their daily speech, writing, reading, and listening. 2. Recognize the structure of the sentence. 3. To address the issue of grammatical errors that affect effective communication 4. To improve your reading skills through the practice of vocabulary enrichment, reading comprehension exercises, speed reading strategies,

	written responses, discussions, and reflections 5. Develop writing skills.
Indicative Contents	Indicative content includes the following. Introduction: about new headway pre-intermediate plus [1 hrs] Tenses: past-present-future, wh- questions. Vocabulary- using a bilingual dictionary, reading (communication). Everyday English (social expressions) [9 hrs] Grammar: Review about tenses, Present tenses, have and have got. Vocabulary: about (daily life), listening and match between verb and nouns. Practices about simple present and present continuous, Reading: about living in the USA. Social expressions about every day English. [8 hrs] Past tenses, simple past and past continuous, practice, Reading and listening, regular and irregular verbs. Vocabulary: about N.- V.- Adj. endings. Everyday English (time expressions). [6hrs] Grammar: the quantities, also about Something/someone/somewhere, practices. Reading: about markets, practices. [6 hrs

Learning and Teaching Strategies	
Strategies	- The main strategy that will be adopted in developing the four skills: - The skill of speaking. - The skill of reading. - The skill of writing. - The skill of listening. - Also, enables the students the use grammar correctly.

Student Workload (SWL) **For 15 weeks**			
Structured SWL (h/sem)	32	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	18	**Unstructured SWL (h/w)**	1

Total SWL (h/sem)	**50**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: new headway pre-intermediate plus
Week 2	Grammar: Tenses, wh- questions, practices.
Week 3	Vocabulary- how to use a bilingual dictionary, reading about (communication)
Week 4	Everyday English (social expressions), listening, practices.
Week 5	Grammar: Present tenses, have and have got, practices.
Week 6	Vocabulary about (daily life), listening, and match between vocabularies, and practices.
Week 7	Mid-term Exam.
Week 8	simple present and present continuous, practices, reading about living in the USA.

Week 9	Social expressions about everyday English, practices.
Week 10	Grammar: simple past and past continuous tenses, and practices.
Week 11	Reading and listening, regular and irregular verbs, practices.
Week 12	Vocabulary: about N.- V.- Adj. endings, practices, Everyday English (time expressions), practices.
Week 13	Grammar: quantity (some, many, any, much, few,….), practice.
Week 14	Grammar: about Something/someone/somewhere, practices.
Week 15	Reading: about markets, practices.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	None
Week 2	None
Week 3	None
Week 4	None
Week 5	None
Week 6	None
Week 7	None

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Headway pre-intermediate plus student's book. (John and Liz Soars)	Yes

Recommended Texts	Headway pre-intermediate plus work's book	Yes
Websites	https://7esl.com/	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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.

Semester Two

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Operations Research (2)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**OR107**			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial**	
				☐ **Practical**	
Module Level	**UGI**	**Semester of Delivery**	**2**		
Administering Department	**OR**	**College**	**CSM**		
Module Leader	**Oday Abdulrahman Jarjies**	**e-mail**	**odayjarjies@uomosul.edu.iq**		
Module Leader's Acad. Title	**Lecturer**	**Module Leader's Qualification**	**Ph.D.**		
Module Tutor	**Ghazwan Alsoufi**	**e-mail**	**ghazwan.alsoufi@uomosul.edu.iq**		
Peer Reviewer Name	**Name**	**e-mail**	**E-mail**		
Scientific Committee Approval Date	**1/02/2025**	**Version Number**	**1.0**		

Relation with other Modules			
Prerequisite module	Operations Research (1)	**Semester**	1
Co-requisites module	برمجة صحيحة وحركية	**Semester**	3

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and an understanding of operations research through applying formulas to solve some examples.

	2. Use mathematical and engineering methods to study optimization problems in Business and Management, Economics, Computer Science, Civil Engineering, Industrial Engineering, etc. 3. This course introduces frameworks and ideas about various types of optimization problems in the business world. 4. In particular, we focus on how to formulate real business problems into mathematical models that can be solved by computers.
Module Learning Outcomes	1. Dual Model 2. Definition of the Dual Problem 3. Solution of the Dual Problem 4. Relationship Between Primal and Dual Objective Values 5. Dual Simplex Method 6. Economic interpretation of the corresponding model 7. Interpreting the Simplex Tableau : Sensitivity Analysis 8. Post optimal or Sensitivity Analysis 9. Changes Affecting Optimality 10. Changes Affecting Feasibility 11. Changes Affecting Optimality and Feasibility 12. Parametric Linear Programming 13. Mathematical Foundations 14. Standard LP Model in Matrix Form 15. Revised (Primal) Simplex Method 16. Steps of the Primal Revised Simplex Method
Indicative Contents	Indicative content includes the following. <u>Part A- Dual Problem [10 hrs]</u> • Definition of the Dual Problem • Constraints • Data • Objective Functions <u>Part B- Solution of the Dual Problem [15 hrs]</u> • Relationship Between Primal and Dual Objective Values

	• Dual Simplex Method • Economic interpretation of the corresponding model Part C-Sensitivity Analysis [25 hrs] • Post optimal or Sensitivity Analysis • Changes Affecting Optimality • Changes Affecting Feasibility • Changes Affecting Optimality and Feasibility Part D- Parametric Linear Programming [10 hrs] • Changes in C • Changes in B • Changes in Pj • Simultaneous Changes in C and b • Mathematical Foundations • Standard LP Model in Matrix Form • Basic Solution and Bases • The Simplex Tableau in Matrix Form Part E- Revised (Primal) Simplex Method [10 hrs] • Product Form of the Inverse • Steps of the Primal Revised Simplex Method Part F- tools [5 hrs] • The linear programming problem can be solved using different methods, such as the Dual Simplex Method, Sensitivity Analysis, or by using tools such as WINQSB, LINGO, QMP, open solver etc.

Learning and Teaching Strategies	
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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (10)	4 and 10	LO #1- #4 and #9-#12
	Assignments	1	10% (10)	5	LO #1- #4
	Report	1	10% (10)	13	LO #1- #12
Summative assessment	**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)	
	Material Covered
Week 1	Dual Model and Definition of the Dual Problem
Week 2	Solution of the Dual Problem
Week 3	Relationship Between Primal and Dual Objective Values
Week 4	Dual Simplex Method
Week 5	Economic interpretation of the corresponding model
Week 6	Interpreting the Simplex Tableau : Sensitivity Analysis
Week 7	Numerical examples

Week 8	Parametric Linear Programming
Week 9	Numerical examples
Week 10	Mathematical Foundations and Standard LP Model in Matrix Form
Week 11	Numerical examples
Week 12	Revised (Primal) Simplex Method
Week 13	Numerical examples
Week 14	Product Form of the Inverse
Week 15	Steps of the Primal Revised Simplex Method
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	حمدي طه	Yes
Recommended Texts	1-مقدمة في نماذج البرمجة الخطية بين النظرية والتطبيق , سعد النعيمي. 2-بحوث العمليات , احمد حاتم عبدالله	No
Websites	https://www.tutorialsduniya.com/notes/linear-programming-applications-notes/	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A –** Excellent	**excellence**	90 – 100	Outstanding Performance
	B - Very Good	**Very good**	80 – 89	Above average with some errors
	C – Good	**good**	70 – 79	Sound work with notable errors
	D – Satisfactory	**median**	60 – 69	Fair but with major shortcomings

	E – Sufficient	**accepted**	50 – 59	Work meets minimum criteria
Fail Group	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	**Failed**	(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

Module Information					
Module Title	**Calculus (2)**			**2 Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Tutorial** ☐ **Lab** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR108**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**UGI**	**Semester of Delivery**		**2**
Administering Department		**OR**	**College**	**CSM**	
Module Leader	**Edrees M. Nori Mahmood**		**e-mail**	**edreesnori@uomosul.edu.iq**	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**Ahmed Naziyah Abdullah**		**e-mail**	**Ahmed.alkhateeb@uomosul.edu.iq**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		26/01/2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Calculus (1)	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop basic mathematical skills necessary for all branches of mathematics. 2. To develop the ability to think in mathematical analysis to solve problems. 3. learn the techniques of differentiation of functions such as trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic functions. 4. Studying integration methods and identify the most appropriate method. 5. understanding the concept of functions in multiple variables. 6. To learn to find the partial derivatives of functions in two variables. 7. To learn to find extrema of functions in two variables

	8. To learn calculate double integrals.
Module Learning Outcomes	1. Understand the properties of transcendental functions and how to identify them. 2. The ability to find derivatives and integrals of transcendental functions. 3. Training the students on integration methods and evaluating the most appropriate method to find it. 4. Understanding multivariate functions. 5. The ability to find partial derivatives. 6. The ability to identify and find extreme values of functions in two variables. 7. The ability to understand and evaluate double integrals. 8. Employing the concept of double integrals in solving mathematical problems.
Indicative Contents	Indicative content includes the following. Trigonometric functions. [5 hrs] Inverse trigonometric functions. [5 hrs] Exponential functions. [5 hrs] Logarithmic functions. [5 hrs] Hyperbolic functions. [5 hrs] Methods of Integration. [15 hrs] Functions of Several Variables. [5 hrs] Partial derivatives. [10 hrs] Extreme values of functions in two variables [5 hrs] Double integrals. [5 hrs] Applications of double integration. [5 hrs] Polar coordinates. [5 hrs]
Learning and Teaching Strategies	
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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Trigonometric functions, derivatives and integrations.

Week 2	Inverse trigonometric functions, derivatives, integrals resulting in inverse trigonometric functions
Week 3	Exponential functions, domain, range, and its properties, derivatives and integrations.
Week 4	Logarithmic functions, domain, range, and its properties, derivatives of logarithmic functions
Week 5	Hyperbolic functions, derivatives and integrations.
Week 6	Methods of Integration: Integration by parts, integrals of powers of trigonometric functions, trigonometric substitutions.
Week 7	Methods of Integration: integration by substitution, other substitutions.
Week 8	Methods of Integration: integration by partial fractions, integrals of quadratic formulas.
Week 9	Functions of Several Variables: Functions of two Variables, domain and range.
Week 10	Partial derivatives of functions of two variables.
Week 11	second-order partial derivatives of functions of two variables.
Week 12	Extreme values of functions in two variables.
Week 13	Double integrals
Week 14	Applications of double integration (finding area, volume, mass, centers of mass, and …).
Week 15	Polar coordinates, relationship between polar and cartesian coordinates.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	مبادئ الرياضيات التفاضل والتكامل للدكتور علي عزيز علي واخرون. التفاضل والتكامل د. رمضان محمد جهيمة و د. أحمد عبد العالي، 2002 الجزء الأول + الجزء الثاني	yes
Recommended Texts	Thomas Calculus Schaum's calculus series Calculus of one and several Variaables,11th Edition	yes
Websites	https://www.khanacademy.org/math/calculus-1 https://tutorial.math.lamar.edu/classes/calci/calci.aspx https://www.khanacademy.org/math/calculus-2 https://tutorial.math.lamar.edu/classes/calcII/calcII.aspx https://tutorial.math.lamar.edu/classes/calciii/multivrblefcns.aspx	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	**Failed**	(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

Module Information

Module Title	Programming (2)	**Module Delivery**	
Module Type	Basic	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	OR109		
ECTS Credits	8		
SWL (hr/sem)	200		

Module Level	**UGI**	**Semester of Delivery**	**2**
Administering Department	**OR**	**College**	CSM
Module Leader	كرم عادل عبد	**e-mail**	karamadel@uomosul.edu.iq
Module Leader's Acad. Title	lecture	**Module Leader's Qualification**	ماجستير
Module Tutor	كرم عادل عبد	**e-mail**	
Peer Reviewer Name	كرم عادل عبد	**e-mail**	
Scientific Committee Approval Date	**2025/1/24**	**Version Number**	**1.0**

Relation with other Modules

Prerequisite module	Programming (2)	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	5. To develop problem-solving skills and understanding of programming in general by applying the Matlab language. 6. This course deals with the basic concepts of programming in the Matlab language 7. This is the basic topic of all forms of programming. 8. To understand programming problems and ways to solve them using the MATLAB language.

Module Learning Outcomes	In MATLAB, an array can have several outputs, depending on how it is used and the operations performed on it. Here are some common outputs of arrays in MATLAB: 1. Learn how to program in its simplest form. 2. Array elements: The most basic output of an array is its elements. You can access individual elements of an array by indexing it with their corresponding indices. For example, if A is a 3x4 array, then A(1, 2) returns the element at row 1, column 2. 3. Row or column vectors: You can extract rows or columns from an array by using the colon operator. For example, A(1:2, :) returns the first two rows of A as a 2x4 row vector, while A(1, :) returns the first column of A as a 1x4 vector. 4. Matrix: You can extract a matrix from an array by specifying the row and column indices. For example, A(1:2, 1:2) returns a 2x2 matrix from the first two rows and columns of A. 5. Vector: You can convert an array into a vector by using the reshape () function. For example, reshape (A, 1, []) returns a column vector of the elements of A. 6. Sum: The sum () function can be used to calculate the sum of all elements in an array. For example, sum(A) returns the sum of all elements in A. 7. Product: The prod () function can be used to calculate the product of all elements in an array. For example, prod(A) returns the product of all elements in A. 8. Mean: The mean () function can be used to calculate the mean of all elements in an array. For example, mean(A) returns the mean of all elements in A. 9. Standard deviation: The std () function can be used to calculate the standard deviation of all elements in an array. For example, std(A) returns the standard deviation of all elements in A. 10. Transpose: The transpose () function can be used to transpose the elements of an

	array. For example, A.' returns the transpose of A. 11. Determinant: The determinant () function can be used to calculate the determinant of a square array. For example, determinant(A) returns the determinant
Indicative Contents	The indicative contents of MATLAB can be divided into several categories, including: 1. Basics: These contents include learning about the graphical interface of MATLAB Desktop and the tools used in software development, in addition to learning about the basic commands in the language. 2. Programming concepts: The guidance should contain important concepts in programming, such as conditionals, loops, arrays, and data manipulation. 3. Graphing: The instruction should include an explanation of how to plot data using MATLAB, such as line graphs, pie charts, and 3D graphics. 4. Statistics and data analysis: The guidance can contain an explanation of how to use MATLAB to analyze data and perform statistical operations, such as estimating differential equations, factor analysis, and classification. 5. Machine Learning: Mentorship can also include an explanation of how to use MATLAB to develop machine learning models, such as classification, clustering, and factor analysis models. 6. Achievement applications: The guidance can contain examples and applications of tools and techniques available in MATLAB, such as biostatistics, control, medical imaging, and other fields. In general, the guidance should contain practical examples and exercises that allow the user to apply the concepts and tools explained in practice.[90 h]

Learning and Teaching Strategies	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to use the MATLAB language and then 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) For 15 Weeks			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	**200**		

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	General introduction to matrices
Week 2	Inserting and addressing arrays
Week 3	Types of arrays
Week 4	Operations on arrays
Week 5	Solve various examples of matrices
Week 6	Solve various examples of matrices using the dash "if" statement and the "for" statement
Week 7	Pre-packaged functions with (private) arrays
Week 8	Generate matrices
Week 9	Rotate and reshape matrices
Week 10	Expanding arrays
Week 11	Partial matrices
Week 12	Changing the array elements while deleting some array elements
Week 13	Introduction to drawing in MATLAB
Week 14	Drawing in the "Matlab" system in two dimensions
Week 15	Drawing in the "Matlab" system in three dimensions

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: General introduction to arrays
Week 2	Lab 2: Entering and addressing arrays
Week 3	Lab 3: types of arrays

Week 4	Lab 4: operations on arrays
Week 5	Lab 5: Solve various examples of matrices
Week 6	Lab 6: Solve various examples of matrices using the conditional "if" and "for" statements
Week 7	Lab 7: Functions ready with (special) matrices
Week 8	Lab 8: Generating Matrices
Week 9	Lab 9: Rotate and reshape the matrix
Week 10	Lab 10: Expanding Matrices
Week 11	Lab 11: Partial matrices
Week 12	Lab 12: Changing matrix elements
Week 13	Lab 13: Drawing in MATLAB in two dimensions
Week 14	Lab 14: Drawing in MATLAB in three dimensions
Week 15	Lab 15: General review

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts النصوص المطلوبة	2- محمد رفيق علي ," تطبيقات الماتلاب الهندسية ", جامعة البلقاء التطبيقية, 2010 .	Yes
Recommended Texts	The MathWorks, Inc., MATLAB®13 Help, 2020	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme				
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.

MODULE DESCRIPTION FORM

Module Information					
Module Title	Principle of Statistics			**Module Delivery**	
Module Type	Basic			☒ Theory ☒ Lecture ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**OR110**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	**UGI**		**Semester of Delivery**		**2**
Administering Department	**OR**		**College**	**CSM**	
Module Leader	**د. زينب توفيق حامد**		**e-mail**	**zainab.tawfeek@uomosul.edu.iq**	
Module Leader's Acad. Title	**lecturer**		**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**د. هدى عصام**		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/02/2025**		**Version Number**		**1.0**

Relation with other Modules			
Prerequisite module	None Requirements module smoother	**Semester**	
Co-requisites module	None Complementary requirements unit	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1 -Introducing the student to the subject of statistics and its relationship to other subjects 2 -Introducing the student to the basic concepts of statistics 3 -Introducing the student to measures of central tendency, their characteristics and disadvantages 4 -Introducing the student to measures of dispersion, their characteristics and disadvantages 5 -Introducing the student to simple and multiple correlation between variables

	6 -Teaching the student to create statistical tables and calculate the above concepts for them, and graphs
Module Learning Outcomes	1- Teaching the student to deal with data and put it in statistical tables 2-The student will be able to find statistical measures such as the rate, variance, geometric mean, harmonic, and squared data for classified and non-classified .data 3-The student will be able to find the median and the mode 4-The student will be able to represent data using graphical forms such as histograms, histograms, and circles 5-The student will be able to read his results by calculating the arithmetic mean, variance, etc. 6- The student's knowledge of the variables and the type of relationship between them, direct or inverse.
Indicative Contents	Instructional content includes the following: Chapter one. the introduction. The emergence and development of statistics. Definition of statistics and its application areas. The statistical method in scientific research and the research design method [4 hours] Chapter II. Collect, classify and tabulate data. Data collection method (comprehensive recording, samples). Data collection methods (direct collection, questionnaire) [4 hours] Classification and tabulation of data. Sampling [3 hours] Chapter III. Frequency distributions and data presentation methods. Random variables (discrete and continuous) Quality and quantity). Tabular presentation of data (frequency distribution/relative [frequency distribution) [10 hours Paired frequency distribution/clustered frequency distributions. Geometric display (bar/rectangular/circle/line) (histogram, histogram, polygon) (clustered histograms) Shapes of frequency distributions (symmetric and asymmetric) [6 hours] the fourth chapter. Measures of central tendency. Addition and multiplication symbols. The concept of averages and the purpose of calculating them. Average calculation. Geometric mean. The compromise middle. The square mean and the relationship

	between them. The mediator and the mode. (Disadvantages and advantages of the milieus, medium, and mode). Choosing the appropriate measure of central tendency [6 hours] Chapter V . Measures of dispersion. The concept of dispersion and the purpose of calculating it. Calculate variance. Calculate the standard deviation (for ungrouped and tabulated data). Common variance. Coefficient of variation [6 hours] Relative dispersion coefficients , Simple and multiple linear correlation [6 hours]

Learning and Teaching Strategies	
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 achieved through interactive classes and tutorials

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
	Quizzes	2	20% (20)	5 and 10	LO #1, #2 and #10, #11

Formative assessment	**Assignments**	2	10% (10)	4 and 12	LO #3, #4 and #6, #7
	Projects / Lab.		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	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Chapter one. the introduction. The emergence and development of statistics. Definition of statistics and its application areas**
Week 2	**The statistical method in scientific research and the research design method**
Week 3	**Chapter II. Collect, classify and tabulate data. Data collection methods (comprehensive registration/sampling). Data collection methods (direct collection/questionnaire). Data classification and tabulation. Selection of samples**
Week 4	**Chapter III. Frequency distributions and data presentation methods. Random variables (discrete and continuous). (Quality, quantity). Tabular display of data (frequency distribution/relative frequency distribution)**
Week 5	**Paired frequency distribution / distributions (clustered frequency). Geometric display (bar graph / rectangle graph / graph circle / line)(histogram. frequency polygon)**
Week 6	**Clustered frequency curves. Forms of frequency distributions (symmetric and asymmetric)**
Week 7	**Chapter Four. Measures of central tendency. Addition and multiplication symbols. The concept of averages and the purpose of calculating them. Arithmetic mean . How to calculate unclassified and classified variables. Defects . Advantages**

Week 8	**The advantages are the geometric mean. Harmonic mean. The square mean. Methods for calculating these averages. Disadvantages and advantages. The relationship between these averages and their relationship with the arithmetic mean**
Week 9	**Mediator . Loom. Calculation method. Defects. Advantages. The relationship with the arithmetic mean. Choosing an appropriate measure of central tendency**
Week 10	**Chapter V. Measures of dispersion. The concept of dispersion. The goal of calculating it**
Week 11	**variance. standard deviation. calculation method . Defects. Advantages. Covariance**
Week 12	**Relative dispersion coefficients. Coefficient of variation. Standard score**
Week 13	**Calculating the variance of classified data. Calculate the standard deviation of tabulated data**
Week 14	**Relative dispersion coefficients**
Week 15	**Simple and multiple linear correlation.**
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	الإحصاء/د. محمود حسن المشهداني/امير حنا هرمز /جامعه بغداد 2- المدخل إلى الإحصاء/د. خاشع الراوي/ جامعه الموصل 3- Allan G. Bluman/2012 /Elementary	yes
Recommended Texts	1- مبادئ الإحصاء. احمد عبد السميع،دار اليازوري العلمية للنشر، 2008 2- مبادئ الإحصاء. الدكتور طه حسين الزبيدي، دار غيداء للنشر، 2012	No
Websites	https://books-library.net/c-Statistics-download	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information

Module Title	**Arabic Language**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM 1011**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	UGI	**Semester of Delivery**	2
Administering Department	OR	**College**	CSM
Module Leader	م.م. مروة عدنان إسماعيل	**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		**e-mail**	
Scientific Committee Approval Date	1/02/2025	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	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	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 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) For 15 weeks

Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

		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)		

elivery 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

	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				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Computer course 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM1031**				
ECTS Credits	**3**				
SWL (hr/sem)	**100**				
Module Level	**1**		**Semester of Delivery**	2	
Administering Department	**OR**		**College**	**CMS**	
Module Leader	هند طلعت ياسين		**e-mail**	hindtalaat48@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	**M.D.**	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	**6/1/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understand the basic concepts of computers, including hardware and software. 2. Identify and effectively use computer components and peripherals. 3. Develop skills in operating systems and graphical user interfaces (GUI). 4. Master creating and formatting documents using word processing software. 5. Learn to create and analyze data using spreadsheet applications. 6. Enhance skills in designing professional presentations. 7. Gain knowledge of internet basics and effective web browsing. 8. Strengthen email communication skills for personal and collaborative use. 9. Familiarize with cloud computing services and their applications. 10. Improve productivity and efficiency through modern technical tools.
Module Learning Outcomes	1. Comprehensive understanding of computer concepts and components. 2. Ability to connect and configure input/output devices with the CPU. 3. Proficiency in using operating systems and graphical interfaces. 4. Capability to create and format professional documents. 5. Skill in managing and analyzing data using spreadsheets. 6. Competence in creating interactive and visually appealing presentations. 7. Effective use of the internet for research and networking. 8. Efficient management of email accounts and document sharing. 9. Hands-on experience with cloud-based tools like Google Workspace and Office 365. 10. Enhanced technical proficiency for increased productivity.
Indicative Contents	1. **Introduction to Computers**: Definition of computers and their components (hardware and software), and connecting peripherals to the CPU. 2. **Computer Components**: Basic components of a computer like the CPU and types of memory. 3. **Operating Systems and User Interface**: Working with common operating systems and using graphical user interfaces (GUI). 4. **Word Processing**: Creating and formatting documents using software like Microsoft Word. 5. **Spreadsheets**: Using software like Excel to analyze data and create pivot tables. 6. **Presentations**: Designing presentations using PowerPoint with added effects and transitions. 7. **Internet and Web Browsers**: Using the internet, web browsers, and search engines. 8. **Email**: Sending and receiving emails, and collaborating on documents. 9. **Cloud Computing**: Using cloud applications such as Google Workspace and Office 365.

Learning and Teaching Strategies	
Strategies	The primary strategy adopted in delivering this unit is to encourage student participation in exercises while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive classroom and educational programs using appropriate teaching strategies, methods, and teaching aids to develop thinking skills.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**100**		

Module Evaluation					
		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	5	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	2	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)	
	Material Covered
Week 1	• **Introduction to Computer:** Concepts of Hardware and Software with their components; Concept of Computing, Data and Information; Connecting input/output devices, and peripherals to CPU.
Week 2	• **Computer Components:** Computer Portions, Hardware Parts, I/O Units, Memory Types.
Week 3	• **Computer Components (Cont.):** Basic CPU Components, Computer Ports, Personal Computer, Personal Computer (Features and Types)
Week 4	• **Operating System and Graphical User Interface GUI:** Operating System; Basics of Common Operating Systems; The User Interface, Using Mouse Techniques.
Week 5	• **Operating System and Graphical User Interface GUI(Cont**.): Use of Common Icons, Status Bar, Using Menu and Menu-selection, Concept of Folders and Directories, Opening and closing of different Windows; Creating Short cuts.
Week 6	• **Word Processing:** Word Processing Basics; Basic Features of Word Processors, Opening and Closing of documents, Text creation and Manipulation; Formatting Text and Paragraphs, Using Templates for Document Creation.
Week 7	• **Word Processing (Cont.)**: Creating and Managing Tables, Utilizing Styles and Themes, Spell Check and Grammar Tools, Using Headers and Footers.
Week 8	• **Mid-exam** • **Spread Sheet:** Introduction to Spreadsheet Software, Creating and Formatting Worksheets. Sorting and Filtering Data, Using Formulas and Functions.
Week 9	• **Spread Sheet (Cont.):** Using Formulas and Functions, Using Pivot Tables for Data Analysis, Data Validation and Error Checking, Data Visualization: Creating Charts and Graphs.
Week 10	• **Presentation Software**: Introduction to Presentation Software, Overview of Popular Presentation Tools, creating a New Presentation, Using Templates and Themes, Inserting and Formatting Text and Images, Transition and Animation Effects.
Week 11	• **Presentation Software (Cont.):** Using Speaker Notes and Timers,, Advanced Features: Hyperlinks and Action Buttons, Troubleshooting Common Presentation Issues, Future Trends in Presentation Technology.
Week 12	• **Introduction to Internet and Web Browsers:** Computer networks Basic; LAN, WAN; Concept of Internet and its Applications; connecting to internet.
Week 13	• **Introduction to Internet and Web Browsers (Cont.):** World Wide Web; Web Browsing software's, Search Engines; Understanding URL; Domain name; IP Address.
Week 14	• **Communications and Emails:** Basics of electronic mail; getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration.
Week 15	• **Introduction to Cloud Computing and Services:** Definition of Cloud Computing and its concept, Cloud-Based Office Suites (Office 365 and Google Workspace), Google Docs, Google Sheets, Google Drive, Google Meet.
Week 16	• Comprehensive review of all topics.

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Lab 1	Word App
Lab 2	Excel App
Lab 3	Power point App
Lab 4	E-mail App

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**كتاب: "أساسيات الحاسوب" المؤلف:** الخضر علي الخضر بحاث **كتاب: "تطبيقات الاكسل" المؤلف:** الخضر علي الخضر بحاث	Yes
Recommended Texts	كتاب اوفيس -Word2016- Excel 2016- Access2016) PowerPoint 2016 (2016 المؤلف:وفاء أحمد ناجي	Yes
Websites	https://www.youtube.com/watch?v=Olm22l7gae4&list=PLZZdF7TtQ_kpNyAsll5YvINc-i_RhPnbX https://www.youtube.com/watch?v=SxmL1U3oc-A&list=PLZZdF7TtQ_kpNyAsll5YvINc-i_RhPnbX&index=2 https://www.youtube.com/watch?v=2Yvxp9N6w6I&list=PL0jjySeobjbKKKsDTxxqAowWcYp1QkcbN	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Perfect
	B - Very Good	**Very good**	80 - 89	median

	C - Good	**good**	70 - 79	Good work with noticeable errors
	D - Satisfactory	**median**	60 - 69	Fair but with significant errors
	E - Sufficient	**accepted**	50 - 59	More work is required but to achieve the minimum
Fail Group **(0 – 49)**	**FX –** Fail	**Failed (in process)**	(45-49)	Failure to perform: A significant amount of work is required
	F – Fail	**Failed**	(0-44)	Failure to perform: A significant amount of work is required

Note: Decimals greater than or less than 0.5 will be rounded up to the highest or lowest whole mark (e.g., a mark of 54.5 will be rounded up to 55, while a mark of 54.4 will be rounded up to 54). The University has a policy of not condoning a 'close pass failure' and therefore the only adjustment to marks awarded by the original mark(s) will be the automatic rounding shown above.

Semester Three

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Integer & Dynamic Programming**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR201**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**2**		**Semester of Delivery**	3	
Administering Department	**OR**		**College**	CSM	
Module Leader	Dr.Mohammed Ahmed Alkailany		**e-mail**	**alkailanym@uomosul.edu.iq**	
Module Leader's Acad. Title	**Lecture**		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Lamyaa Jasim Mohammed		**e-mail**	lomuaajasem@uomosul.edu.iq	
Scientific Committee Approval Date	2/02/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Operation Research	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This course aims to introduce students to how to solve integer and dynamic programming models, through different methods of solving and how to deal with time in dynamic models

	.
Module Learning Outcomes	Important: Write at least 6 learning outcomes, ideally equal to the number of weeks of study. 1- The student writes some terms 2- The student describes the model 3- To distinguish between the models 4- To explain the mathematical formula to the student 5- The student summarizes the steps for solving the mathematical formula 6- The student presents a problem from reality 7- That the student compare the methods of solution 8- To rearrange the solution method 9- To plan how to use the appropriate method in the solution 10- The student applies the model to a realistic situation 11- The student reveals the error in the form. 12- The student should schedule the results
Indicative Contents	Indicative content includes the following. Chapter (1): Illustrative Applications of Integer Programming [40 hours] Dichotomies Solution Methods of Integer Programming Branch – and – Bound Algorithm Cutting – Plane Algorithms The Fractional (Pure Integer) Algorithm The Mixed Algorithm Zero – One Polynomial Programming Chapter (2) Dynamic (Multistage) Programming [35 hours]

	Elements of the DP Model : The Capital Budgeting Example DP Model Backward Recursive Equation More on the Definition of the state Examples of DP Models and Computations Problem of Dimensionality in Dynamic Programming Solution of Linear Programs by Dynamic Programming Backward Recursive Equation

Learning and Teaching Strategies	
Strategies	1- Determine the scientific concepts and principles that will be learned and put forward in the form of a question or problem. 2- Preparing the educational materials needed to implement the lesson. 3- Formulating the problem in the form of sub-questions so as to develop the skill of imposing assumptions among the learners 4- Determine the discovery activities or experiments that the learners will carry out. 5- Evaluate learners and help them apply what they have learned in situations

Student Workload (SWL) **For 15 weeks**			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	4

Total SWL (h/sem)	**150**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	15% (15)	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)		

Summative assessment التقييم التلخيصى		**Formative assessment** التقييم التكويني
الامتحان النهائي	امتحان نصف الفصل	% ٤٠
% ٥٠	% ١٠	

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Illustrative Applications of Integer Programming**
Week 2	Dichotomies
Week 3	Solution Methods of Integer Programming
Week 4	Branch – and – Bound Algorithm
Week 5	Cutting – Plane Algorithms
Week 6	The Fractional (Pure Integer) Algorithm
Week 7	The Mixed Algorithm
Week 8	Zero – One Polynomial Programming
Week 9	**Chapter (2) Dynamic (Multistage) Programming** Elements of the DP Model : The Capital Budgeting Example
Week 10	DP Model
Week 11	Backward Recursive Equation
Week 12	More on the Definition of the state
Week 13	Examples of DP Models and Computations
Week 14	Problem of Dimensionality in Dynamic Programming
Week 15	Solution of Linear Programs by Dynamic Programming
Week 16	Backward Recursive Equation

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered

Week 1	
Week 2	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Operation Research (2011) Gupta	Yes
Recommended Texts	Hamdy A. Taha , "Operations Research" *University* of *Arkansas, Fayetteville*	No
Websites		

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Probability Theory (1)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR202**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**UGII**		**Semester of Delivery**	**3**	
Administering Department	**OR**		**College**	**CSM**	
Module Leader	**Saifuldeen Dh. Saeed Alrefaee**		**e-mail**	**Saifldeen.alrefaee@uomosul.edu.iq**	
Module Leader's Acad. Title	**lecturer**		**Module Leader's Qualification**	**M.Sc.**	
Module Tutor	**Salih Muayad Shakir**		**e-mail**	**Salih.mooaed@uomosul.edu.iq**	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/02/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	Probability Theory (2)	**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Grasp the set theory fundamentals: Learn subsets, complements, unions, intersections, and set partitioning. Explore theorems and proofs for deeper understanding. 2- Developing the student's abilities on counting methods to reach sets theory as well as the binomial expansion law. 3- Acquire probability theory knowledge: Introduce concepts like sample space, events, and connections to random experiments. Explore Classical and Axiomatic approaches and utilize tools for understanding the events. 4- Realization of conditional probability and axioms: Learn theoretical foundations, practical calculations, and their application in problem-solving.

	5- Explore Bayes' theory and applications: Introduce valuable tools for advanced probability work and real-world utilization. 6- Provide a solid foundation for advanced work on probability and its applications, and is essential to understanding many applied fields. Overall, the objectives of this module include building a strong foundation in set theory, developing proficiency in combinatorics and probability, and introducing advanced topics like conditional probability and Bayes' theory.
Module Learning Outcomes	1- Understand the basic concepts of probability and its relationship with set theory. 2- Apply fundamental theorems in probability theory to solve problems. 3- Identifying the counting methods in determining the sample space of the set's theory as well as the expansion theory 4- Understand the concept of random experiments and their role in probability theory. 5- Define sample space and events and their relevance to probability calculations. 6- Differentiate between different kinds of probability, such as classical, empirical, and subjective. 7- Calculate probabilities based on defined events within a sample space. 8- Understand and apply the axioms of probability to solve problems. 9- Analyze and determine the independent and non-independent events in probability calculations. 10- Identify conditional probability and build models and laws for any experiment. 11- Apply Bayes' theorem to calculate probabilities in situations involving conditional events. 12- Building a basic base for the student to move to the future stages of subjects in which probability theory is a basis.
Indicative Contents	Indicative content includes the following: <u>Part A - Set Theory and Counting Methods</u> Basic set theory - Definition of subsets, complements, difference, union, intersection, and the partition of the set - Some fundamental theorems (with proofs) - Sequences and limits - Definition of the union and intersection for an arbitrary number of sets, De Morgan's theory and lemma with proof Convergent sequences of sets and Definition and examples [15 hrs.] Techniques of Counting and Tree Diagram - Fundamental principle of counting - Arrangements Method, Permutation Method, and Combinations Method - Multinomial expansion with theorem [15 hrs.]

	Binomial Theorems and Theorems combination - Probability and Random Experiment - Definitions of random experiments, sample space, and events [15 hrs.] Part B - Probability Theory and Conditional Probability kinds of Probability and the First Law of Probability (Classical approach) - Probability defined on events - Some theories in the Axiomatic Approach of Probability – Some examples on dice, coins, and playing cards - theories, and proofs of independent events [15 hrs.] Definitions of Conditional Probability and its axioms - Conditional Probability and how to calculate it- Definitions and remarks - Bayes' law, Bayes' theory and its applications [15 hrs.]

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises while improving and expanding their critical thinking skills at the same time by getting acquainted with the theory of probability, in the first part and developing the student's mind. This will be achieved through classes and interactive educational programs to learn about sets theory and counting methods for it, and through learning about the random experiment and sample space in forming sets, as well as using basic probabilistic laws in application in its various forms, which will be the basis for the student for his future stages.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5 and 11	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	4 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)

	Material Covered
Week 1	Introduction of the Probability and Basic set theory.
Week 2	Basic Set theory, definitions of set theory.
Week 3	Some Fundamental Theorems, Fundamental laws of set theory with theorems.
Week 4	Sequence and limits, with theorems.
Week 5	Field, σ-Field, and Power of the set + Quiz.
Week 6	Techniques of Counting, Tree Diagrams, and Arrangement
Week 7	Techniques of Counting, Permutations.
Week 8	Mid-term Exam + Techniques of Counting, Combinations with theorems.

Week 9	Combinations and Binomial theorem and Multinomial Expansion.
Week 10	Probability Introduction, Random Experiment, Events Kinds, Sample Space, and Probability a law.
Week 11	Axiomatic Approach of Probability + Quiz.
Week 12	Probabilistic models according to the basic laws of set theory with theorems.
Week 13	Independent events, Conditional Probability.
Week 14	Conditional Probability, Bayes' law, and Bayes' Theorem
Week 15	Applications of Bayes' Theorem.
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	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

	Text	**Available in the Library?**
Required Texts	1- 1-Introduction to probability theory, Dr. Dhafir H. Rasheed,1999,2-nd edition, Baghdad University 2- 2-probability, Dr.kubais S. A Fahady Dr. Pirlanty J. Shamoon, Ministry of Higher Education and Scientific Research University of Mosul	Yes
Recommended Texts	3- A first course in probability, Sheldon Ross, 2010, Eighth edition. 4- Probability, scheme series	No

Websites	https://www.coursera.org/learn/probability-theory-foundation-for-data-science? https://www.khanacademy.org/math/statistics-probability

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**numerical Analysis (1)**			**Module Delivery**	
Module Type	**Basic**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**OR203**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**UGII**		**Semester of Delivery**		**3**
Administering Department	**OR**		**College**	**CSM**	
Module Leader	**Name: د. زينب توفيق حامد**		**e-mail**	**E-mail zainab.tawfeek @uomosul.edu.iq**	
Module Leader's Acad. Title	**lectuer**		**Module Leader's Qualification**		**Master's**
Module Tutor	**م. اسماء عبدالمنعم عبدالله**		**e-mail**	**E-mail asmaa.abd@uomosul.edu.iq**	
Peer Reviewer Name			**e-mail**	**E-mail**	
Scientific Committee Approval Date	**1/02/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	numerical Analysis (2)	**Semester**	4

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- To enable the student to understand the subject of numerical analysis and its uses 2- To clarify the types of numerical errors 3- 3- To facilitate the solution of linear differential equations in different ways 4- 4- To facilitate the solution of non-linear equations using numerical methods. 5- 5- To compare the analytical solution with the numerical solution of differential equations 6- 6- To learn how to apply programming to numerical methods

Module Learning Outcomes	1. Identify the types of errors and how to derive them. 2. Use simple methods in numerical solution, such as drawing. 3. Use the sign change method to solve the differential equation. 4. Use simple Newton-Raphson methods in the solution. 5. Use the Newton-Raphson method to solve nonlinear equations. 6. Find the value of the root using the Newton-Raphson method. 7. Find the reciprocal of a number using Newton Raphson's method.
Indicative Contents	Part A - Sources of errors Data errors, mathematical model errors, rotation and truncation errors. [5 hours] Approximations, approximations of decimal numbers, rounding of integers. [5 hours] Types of errors, mathematical operations on errors [5 hours] Definition of numerical analysis, the main steps of all numerical analysis methods, solving linear and nonlinear equations by numerical analysis methods. [5 hours] Learn about writing algorithms and flowcharts for numerical methods [5 hours] Part B - Using practical methods or formulas to find the solution to a specific mathematical problem Numerical iterative methods for solving nonlinear equations, explaining each method with algorithm, flowchart, and numerical solution. [50 hours]

Learning and Teaching Strategies

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 educational programs and by considering the types of computer programs that benefit the student.

Student Workload (SWL)

Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	4,8 and 10	LO #1, #2 and #5, #6
	Assignments	1	5% (5)	6	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2, #4and #6
	Midterm Exam	2hr	10% (10)	8	LO #1 - #7

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to numerical analysis, sources of errors, circular cutting error, turning and cutting error
Week 2	Rounding decimal numbers using rotation, rounding integers, types of errors
Week 3	Absolute error, relative error, mathematical operations on errors, comprehensive and diverse examples of the above.
Week 4	Solving nonlinear equations using iterative methods, methods for finding the initial point of any nonlinear equation, drawing method
Week 5	change the sign method (algorithm - flow chart - practical example - practical program in Mathlab language)
Week 6	Numerical iterative methods for solving nonlinear equations - bisection method (method algorithm - flow chart - applied example - practical program)
Week 7	Mid-term Exam

Week 8	Iteration and repetition method (solid point method) ((Method algorithm - Flow chart - Practical example - Practical program in Mathlab language) Electronic lecture
Week 9	False position method (method algorithm - flow chart - applied example - practical program in Mathlab language)
Week 10	- Newton Raphson's method for solving a nonlinear equation (algorithm - flow chart - practical example - practical program in Mathlab language)
Week 11	Disadvantages of Newton-Raphson method - Finding the square root using Newton Raphson (practical examples, practical program in Mathlab language)
Week 12	The general law for finding the reciprocal of a number using Newton Raphson (practical examples, practical program in Mathlab language)
Week 13	Finding the nth root using Newton Raphson (practical examples, practical program in Mathlab language)
Week 14	Hornes method for solving nonlinear polynomial equations
Week 15	**Solutions to the problems for the numerical methods above**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction to Mathlab programs and a review of functions and circuits
Week 2	Programming the method of changing the signal, and the bisection method
Week 3	Solid point method programming
Week 4	Programming the false position method
Week 5	Newton-Raphson method programming
Week 6	Programming the reciprocal method using the Newton-Raphson method
Week 7	Programming a method to find the nth root of any positive real number using Newton-Raphson's method

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	حسون الدلفي و محمود عطا الله مشكور"التحليل الهندسي goodحسن م والعددي التطبيقي".	Yes

Recommended Texts	Fast algorithms for solving a system of linear equations Math and logic	No
Websites	https://www.bacldung.com/cs/category/core-concepts/math-logic)	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Sequencing Problem**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR204**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	**4**		**Semester of Delivery**	3	
Administering Department	OR		**College**	CSM	
Module Leader	**Niam Abdulmunim Abdulmajeed Al-Thanoon**		**e-mail**	**niam.munim@uomosul.edu.iq**	
Module Leader's Acad. Title	**Assistant Professor**		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	د. زهراء عبد العزيز		**e-mail**	zahraaalnuaimi2019@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/02/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1) Identify sequential problems and their concepts, the scheduling problem and its types, scheduling criteria, and the most important scheduling problems for single-machine problems and parallel machines, the multi-processor task, open workshops, the flow workshop, business workshops, and scheduling resource-constrained projects, in addition to the important optimization and scheduling algorithms used in operations research. 2) Use scheduling to schedule operations to provide a general estimate of the production process over time. 3) Control the planning method when scheduling forward or backward starting from a specific date. 4) Improving resource utilization by scheduling production operations according to resource capacity To provide the required materials. 5) Obtain sufficient training in formulating sequential problems, various scheduling, and algorithms to solve these problems. 6) Presenting many real-life problems that can be formulated, such as sequential and tabulation problems.
Module Learning Outcomes	1. Students can learn about scheduling and sequencing problems. 2. Students are able to deal with sequencing problems. 3. Students can deal with scheduling problems. 4. Identify the optimization and scheduling algorithms used for machine and workshop scheduling problems. 5. Recognize the importance of scheduling problems and algorithms in solving practical problems in industry and production. 6. Modeling scheduling and sequencing problems. 7. Enabling the student to write and understand algorithms, solve problems, interpret results, and be able to make the optimal decision in using scheduling algorithms and applying them in real life. 8. Keeping pace with developments in the field of specialization. 9. The use of different types of algorithms that solve scheduling problems and how to develop and improve them.
Indicative Contents	

	Part A - Basic concepts, types of scheduling, scheduling criteria, The resource-constrained project scheduling problem. Part B - Machine Scheduling problems, Single Processor Scheduling Algorithms, Multiprocessor (Parallel) Scheduling Algorithms Part C - Shop Scheduling, Flow Shop Scheduling, Johansen Algorithm for $n/2/F//F_{max}$ Problem, Open Shop Scheduling, Multiprocessor Job Scheduling

Learning and Teaching Strategies	
Strategies	The main strategy adopted in delivering this unit is to encourage students to engage in exercises, while simultaneously enhancing and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials, and by exploring simple experiments that include some sampling activities of interest to students.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	125		

Module Evaluation					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	6	30% (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.			Continuous	All
	Report			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	Sequencing problems, sequence, scheduling, Directed Acyclic Graph Model, homogeneous and heterogeneous processors, types of scheduling, scheduling criteria
Week 2	The resource-constrained project scheduling problem with examples
Week 3	Machine scheduling, basic concepts, machine scheduling problems
Week 4	Single machine (processor) scheduling algorithms ,First Come First Server Scheduling Algorithm Short Job First Scheduling algorithm
Week 5	Priority Scheduling Algorithm , Round Robin Scheduling Algorithm
Week 6	Earliest Due Date Scheduling Algorithm , Moore's Algorithm
Week 7	Parallel Machine Scheduling
Week 8	Multi-machine (multiprocessor) scheduling algorithms, Independent Jobs scheduling algorithms Longest Processing Time Scheduling Algorithm
Week 9	Shortest Processing Time Scheduling Algorithm
Week 10	Multiprocessor Scheduling Algorithms With Out Communication Cost Highest Level First With Estimated Time) Scheduling Algorithm

Week 11	Smallest Co – Level First With Estimated Time Scheduling Algorithm CP/ MISF (Critical Path/ Most Immediate Successors First) Scheduling Algorithm
Week 12	Shop Scheduling Flow Shop Scheduling
Week 13	Johansen's algorithm for the n/2/F//F_{max} problem
Week 14	Open Shop Scheduling
Week 15	Multi-Processor task Scheduling
Week 16	A week of preparation before the final exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	.Lectures prepared by the lecturer (1 2) Kenneth R. Baker and Dan Trietsch,2018, Principles of Sequencing and Scheduling, Second Edition, John Wiley & Sons, Inc. 3) P.K. Gupta & D.S.Hira,2008,Operations Research, S.Chand & Company Ltd. New Delhi.	Yes No Yes
Recommended Texts	1) S. French , 1981,Sequencing and Scheduling: An Introduction to the Mathematics of the Job-Shop. 2) P.Bruker,2006,Complex Scheduling, Springer, Germany. 3) P.Bruker,2007, Scheduling Algorithms, Springer, Germany.	No

Websites	https://www.youtube.com/watch?v=pGRZ8laY-2U https://www.youtube.com/watch?v=o418t7kcOb8	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very Good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Differential equations**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR205**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	**UGII**		**Semester of Delivery**		**3**
Administering Department	OR		**College**	**CSM**	
Module Leader	**Manal Salim Hamdi**		**e-mail**	**E-mail manalsalim@uomosul.edu.iq**	
Module Leader's Acad. Title	**Lecturer**		**Module Leader's Qualification**		**Ph.D.**
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/02/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Calculus (2)	**Semester**	2
Co-requisites module	Supplementary requirements unit	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Enabling the student to recognize the types of differential equations. 2. To have an excellent tool to feel the close relationship between pure mathematics and the physical or engineering sciences. 3. This course deals with the basic concepts of differential equations 4. This is the fundamental topic of all scientific branches 5. Interpreting some laws of natural phenomena and working to solve their problems.
Module Learning Outcomes	1. Identify the types of differential equations. 2. Re-explaining integration methods because they have a fundamental role in solving differential equations 3. Identify the types of solutions used in differential equations. 4. Discuss the methods of solving differential equations according to each type.

	5. Identify each type of equation according to its rank and degree 6. Identify the use of solving equations in applied aspects such as electrical, physical, and chemical.
Indicative Contents	Instructional content includes the following. Part A - Theory of Differential Equations Definition of differential equations mathematically as well as their form, methods of integration, types of differential equations, clarifying the definition of the order and degree of equations as well as their type, linear or not, how is this proven to solve the differential equation. [15 hours] If the solution is found, how can the differential equation be found? Find a solution to the differential equation. Learn about the types of solutions. [10 hours] Using methods for solving equations according to the conditions available in differential equations (separable, homogeneous, complete, incomplete, linear, Bernoulli) as well as other methods . [15 hours] Review Problem Categories [4 hours] Part B - Analog Electronics It includes everything related to the previous topics, such as assignments and discussion of finding the solution to each type of differential equation. [15 hours]

Learning and Teaching Strategies	
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) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (10)	6 and 9	LO #1, #2 and #10, #11
	Assignments	2	5% (5)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	14	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Review of Integration Laws
Week 2	Examples of these laws
Week 3	Methods of Integration (First Method) Partial
Week 4	Examples of the Partial Method
Week 5	Examples of the Second Method, Rational and Radical
Week 6	Daily Test
Week 7	Definition of Differential Equations (Degree and Order)
Week 8	General Solution and Particular Solution
Week 9	Proof of the Solution for the Differential Equation
Week 10	Daily Test
Week 11	Differential Equations (Separable) and Homogeneous Differential Equations
Week 12	Exact Differential Equations
Week 13	Inexact Differential Equations
Week 14	Midterm Exam
Week 15	Linear Differential Equations
Week 16	Final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		
Recommended Texts	Parmanand Gupta,Differential equations and Differential geometry,(2008)	No
Websites	https://link.springer.com/book/10.1007/978-3-319-45261-6	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	Excellence	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors median
	C - Good	good	70 - 79	Sound work with notable errors
	D - Satisfactory	middle	60 - 69	Fair but with major shortcomings
	E - Sufficient	acceptable	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	Deposit (in process)	(45-49)	More work required but credit awarded
	F – Fail	Failed	(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

Module Information					
Module Title	**Crimes of the Former Ba'ath Regime in Iraq**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOM2050				
ECTS Credits	**4**				
SWL (hr/sem)	**50**				
Module Level	UGI		**Semester of Delivery**	3	
Administering Department	OR		**College**	CSM	
Module Leader	م.د . محمود مال الله قنبر		**e-mail**	Mahmood.knbr@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/02/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Raising awareness among the current generation about the crimes of the Ba'ath regime and the dangers of dictatorial systems on nations and people. 2- Helping students learn about an important period in modern Iraqi history. 3- Teaching students the difference between the advantages of a democratic system and the crimes of a dictatorial regime.

	4- Educating students about different types of international and local crimes, as well as societal crimes. 5- Informing students about the mass grave crimes in Iraq, which are among the worst types of international crimes. 6- Teaching students about the methods of torture and oppression used by the regime against significant segments of the Iraqi population. 7- Highlighting the issue of environmental and radioactive pollution, which contributed to the destruction of Iraq's environment due to the policies of the Ba'ath regime. 8- Exploring the most important decisions of the Iraqi Special Tribunal against the symbols of the former regime. 9- Shedding light on crimes that had a significant impact on Iraq and the region, such as the burning of oil wells and the draining of the marshes. Learning about the types and locations of secret prisons and the crimes that -10 ..occurred within them
Module Learning Outcomes	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. *The Definition of Crime Linguistically and Terminologically According to the Humanities* (4 hours) 2. *Student Understanding of Crime and Its Types* (4 hours) 3. *Crimes Committed by the Baathist Regime According to the Decisions of the Iraqi Criminal Court* (4 hours) 4. *Student Knowledge of the Details of the Dujail Massacre, the Execution of Iraqi Merchants, and the Shaaban Intifada* (4 hours) 5. *Student Knowledge of the Crime of Displacing the Feyli Kurds and the Anfal Operations* (4 hours) 6. *Student Knowledge of the Crime of Using Chemical Weapons Against the Defenseless Population in Halabja* (4 hours) 7. *Student Knowledge of Environmental Pollution Crimes in Iraq, Particularly Radiation Pollution in Southern Iraq* (4 hours) 8. *The Crime of Landmine Proliferation and Victims of Explosive Ordnance Stockpiles in the Country* (4 hours) 9. *The Crime of Draining the Marshes and Wetlands in the Country, and the Destruction of Palm Groves and Crops* (4 hours) 10. *Identifying Secret Prisons and Their Locations* (4 hours) 11. *Mass Graves, Their Locations, and the Categories of Victims* (4 hours) 12. *Ethnicities, Religious Sects, and Social Groups That Suffered Injustice* (4 hours) 13. *The Dangers of Dictatorial Regimes and the Advantages of Democratic Systems* (4 hours)

Learning and Teaching Strategies	
Strategies	he main strategy that will be adopted in delivering this module is to raise cultural and psychological awareness among students about the dangers of oppressive, dictatorial regimes that rely on repression and criminal acts against their opponents, particularly the former Baathist regime in Iraq, which committed the most heinous crimes against the people. This will be achieved by highlighting the most significant crimes it committed against the Iraqi people, such as wars, the squandering of the nation's wealth, the suppression and elimination of political dissidents, and its policies that

	brought ongoing tragedies and calamities to Iraq to this day. Students will also be encouraged to research sources and the internet to educate themselves and increase their awareness.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

		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	Crimes of the Ba'ath Regime According to the Iraqi Criminal Court
Week 2	The concept of crime and its classifications
Week 3	Types of international crimes
Week 4	Decisions issued by the Iraqi High Criminal Court
Week 5	Psychological crimes
Week 6	Mechanisms of psychological crimes
Week 7	Effects of psychological crimes
Week 8	Societal crimes
Week 9	Militarization of society
Week 10	The Ba'ath regime's stance on religion
Week 11	Mass grave crimes
Week 12	Locations of prisons and detention centers under the Ba'ath regime
Week 13	War and radioactive pollution
Week 14	City destruction and the scorched-earth policy
Week 15	**Draining of the marshes and bulldozing of palm groves and crops**
Week 16	**End of semester exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Phoebe Marr, The Modern History of Iraq	No

Recommended Texts	Abdul Sattar Al-Douri, Old Papers from the Notebooks of the Ba'ath Party	No
Websites		

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information

Module Title	**English Language**		**Module Delivery**	
Module Type	**Support**		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2022**			
ECTS Credits	**2**			
SWL (hr/sem)	**50**			
Module Level	**UGI**	**Semester of Delivery**	**3**	
Administering Department	**OR**	**College**	**CSM**	
Module Leader	**Zainab Qusay Ahmed Taqi**	**e-mail**	**Zainab.q@uomosul.edu.iq**	
Module Leader's Acad. Title	**Asst. lecturer**	**Module Leader's Qualification**	**master**	
Module Tutor	**None**	**e-mail**	**None**	
Peer Reviewer Name	**None**	**e-mail**	**None**	
Scientific Committee Approval Date	**23/01/2025**	**Version Number**	**1.0**	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. To be able to speak English fluently and accurately. 2. To think in English and then speak. 3. To be able to compose freely and independently in speech and writing. 4. To be able to read books with understanding.
Module Learning Outcomes	1. Addressing grammatical problems that students face in their daily speech, writing, reading and listening.

	2. Identifying sentence structure. 3. Addressing grammatical errors that affect effective communication. 4. Improving reading skills through vocabulary enrichment practice, speed reading strategies, written responses, discussions and reflections. 5. Developing writing skills.
Indicative Contents	The tutoring content includes: Introduction: About the syllabus [1 hour] Tenses: Past-present-future, wh-questions. Vocabulary - Using a bilingual dictionary, Reading (communication). Everyday English (social expressions) [9 hours] Grammar: Review of tenses, present tenses, have, have. Vocabulary: About (everyday life), listening, matching verbs and nouns. Practice on the present simple and present continuous, Reading: About living in the USA. Social expressions on everyday English. [8 hours] Past tenses, past simple and past continuous, practice, reading and listening, regular and irregular verbs. Vocabulary: About adjective, verb, noun. Everyday English (time expressions). [6 hours] Grammar: Quantities, practices. Reading: About markets and practices. [6 hours]

Learning and Teaching Strategies	
Strategies	- - The basic strategy that will be adopted in developing the four skills: - - Speaking skill. - - Reading skill. - - Writing skill. - - Listening skill. - - It also enables students to use grammar correctly.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	32	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	18	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: new headway pre-intermediate plus
Week 2	Grammar: present tenses, and practices.
Week 3	Word formation, time expressions, and practices.

Week 4	Everyday English (social expressions), listening, practices.
Week 5	Grammar: quantities and practices.
Week 6	Articles, listening, and practices.
Week 7	Mid-term Exam.
Week 8	Shopping, prices, listening, practices.
Week 9	Verbs patterns, future forms, listening, and practices.
Week 10	Grammar: everyday expressions, how do you feel? and practices.
Week 11	What…. like, practices.
Week 12	Comparative and superlative, practices.
Week 13	Vocabulary: synonyms and antonyms, practice.
Week 14	directions, listening, and practices.
Week 15	Reading.
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	None
Week 2	None
Week 3	None
Week 4	None
Week 5	None
Week 6	None
Week 7	None

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Headway pre-intermediate plus student's book. (John and Liz Soars)	Yes
Recommended Texts	Headway pre-intermediate plus work's book	Yes
Websites	https://7esl.com/	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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.

Semester Four

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Probability Theory (2)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR207**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**UGII**	**Semester of Delivery**		**4**
Administering Department		**OR**	**College**	**CSM**	
Module Leader	**Saifuldeen Dh. Saeed Alrefaee**		**e-mail**	**Saifldeen.alrefaee@uomosul.edu.iq**	
Module Leader's Acad. Title		**lecturer**	**Module Leader's Qualification**		**M.Sc.**
Module Tutor	**Salih Muayad Shakir**		**e-mail**	**Salih.mooaed@uomosul.edu.iq**	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		**1/02/2025**	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Probability Theory (1)	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Gain a clear understanding the concept of random variables, including discrete and continuous types, and learn about their probability functions and distribution functions in this module. 2- Acquire the skills to compute the probability mass function (p.m.f.) for discrete random variables and the probability density function (p.d.f.) for continuous random variables. This module covers the necessary formulas and techniques for calculating these functions.

	3- Discover discrete and continuous distributions. Learn their characteristics and applications. 4- Gain insight into mathematical expectation by studying definitions, properties, and calculations for various distributions, and explore related properties. 5- Developing the student's role in benefiting from the generated functions and developing problem-solving skills through these functions. 6- Provide a solid foundation for advanced work on probability and its applications, and is essential to understanding many applied fields. Overall, the objectives of this module include gaining a solid understanding of random variables, probability functions, and distribution functions. Students will learn to calculate p.m.f. and p.d.f., explore various discrete and continuous distributions, understand the mathematical expectation, and work with moments and the moment-generating function (MGF) for analyzing random variables.
Module Learning Outcomes	1- Understand the fundamental concept of a random variable and its significance in probability theory. 2- Differentiate between discrete and continuous random variables and their respective characteristics. 3- Explain the probability density function (p.d.f) and its role in describing the probability distribution of continuous random variables. 4- Explain the probability mass function (p.m.f) and its role in describing the probability distribution of discrete random variables. 5- Understand the distribution function (c.d.f) and its relationship to discrete and continuous random variables. 6- Study and explore some of the distributions and their significance in various fields. 7- Ability to characterize and use random variables with general distributions. 8- Calculate and interpret mathematical expectations, means, and variances of random variables. 9- Understand the concept of moments and central moments in analyzing the shape and characteristics of probability distributions. 10- The acquisition of knowledge to calculate and use moment-generating functions and be able to use it to compute the expectation and variance of random distributions. 11- Building a basic base for the student to move to the future stages of subjects in which probability theory is a basis.
Indicative Contents	Indicative content includes the following: <u>Part A - The concept of Random variable & Random distributions</u> The concept of Random variable, Discrete Random variable, Introduction to the probability function, how to obtain the probability mass function from discrete random variables, studying the properties of the probability mass function and discrete Distribution Function (c.d.f), how to obtain the probability density function from continues random variables, studying the properties of the probability density function and continues Distribution Function (c.d.f) [15 hrs.]

	Some discrete distributions; Uniform distribution, Bernoulli distribution, Binomial distribution, Poisson distribution, Geometric distribution, Hypergeometric distribution, and Negative Binomial distribution [15 hrs. Some Continuous distribution; Uniform continuous distribution, Exponential distribution, Normal distribution, Gamma distribution, and Beta distribution [20 hrs.] Part B - Mathematical expectation & Moment generating function Mathematical expectation; Definitions and properties, the expectation of discrete distribution, the expectation of continuous distribution, Mean and Variance for discrete and continuous distribution [10 hrs.] The moment and central moment; Definitions and examples, the moment generating function (m.g.f), Applications of the moment generating function on Some discrete and continuous distribution [15 hrs.]

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises while improving and expanding their critical thinking skills at the same time by getting acquainted with the theory of probability, in the first part and developing the student's mind. This will be achieved through classes and interactive educational programs to learn about random variables and their distributions, and more through learning about the mathematical expectation and moment generating function as well as using it in some random distributions its various forms, which will be the basis for the student for his future stages.

Student Workload (SWL)

For 15 weeks

Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5 and 11	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	4 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)

	Material Covered
Week 1	The concept of Random variable.
Week 2	Discrete Random variable, Probability mass function (p.m.f), and its Distribution function (c.d.f).
Week 3	Continuous Random variable, Probability density function (p.d.f), and its Distribution function (c.d.f).
Week 4	Some discrete distribution; Uniform & Bernoulli distribution.
Week 5	Some discrete distribution; Binomial & Poisson distribution + Quiz.
Week 6	Some discrete distributions; Geometric, Hypergeometric distribution & Negative Binomial.
Week 7	Some Continuous distribution; Uniform continuous distribution.
Week 8	Mid-term Exam + Some Continuous distribution; Exponential distribution.
Week 9	Some Continuous distribution; Normal distribution.
Week 10	Some Continuous distribution; Gamma & Beta distribution.
Week 11	Mathematical expectation + Quiz.

Week 12	Mean and Variance.
Week 13	The moment and central moment.
Week 14	The moment generating function (m.g.f).
Week 15	Applications of the moment generating function on Some distribution (m.g.f).
Week 16	**Preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	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		
	Text	**Available in the Library?**
Required Texts	5- 1-Introduction to probability theory, Dr. Dhafir H. Rasheed,1999,2-nd edition, Baghdad University 6- 2-probability, Dr.kubais S. A Fahady Dr. Pirlanty J. Shamoon, Ministry of Higher Education and Scientific Research University of Mosul	Yes
Recommended Texts	7- A first course in probability, Sheldon Ross, 2010, Eighth edition. 8- Probability, schume series	No
Websites	https://www.coursera.org/learn/probability-theory-foundation-for-data-science? https://www.khanacademy.org/math/statistics-probability https://www.coursearena.io/topic/free-probability-theory-courses	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Numerical Analysis (2)**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR208**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		**UGII**	**Semester of Delivery**		**4**
Administering Department		**OR**	**College**	**CSM**	
Module Leader	**د. زينب توفيق حامد**		**e-mail**	**E-mail zainab.tawfeek @uomosul.edu.iq**	
Module Leader's Acad. Title		**lectuer**	**Module Leader's Qualification**		**Master's**
Module Tutor	**م. اسماء عبد المنعم عبدالله**		**e-mail**	**asmaa.abd@uomosul.edu.iq**	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date		1/02/2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	**Numerical Analysis (1)**	**Semester**	
Co-requisites module	Non	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- To increase and develop the student's information on the subject of 1 numerical analysis and its uses 2- To facilitate the solution of a system of nonlinear differential equations in different ways 4- To learn about improved methods in numerical analysis

	5- To facilitate the solution of a system of linear differential equations in 5 different ways 6- To learn how to apply programming to numerical methods
Module Learning Outcomes	**1. Learn how to use numerical analysis to solve a system of linear equations.** **2. Learn how to use numerical analysis to solve a system of nonlinear equations.** **3. Learn how to improve numerical methods to improve the output and reduce the number of iterations** **4. How to find differential equations by giving data values and function values at the given points and using inclusion, interpolation, and Lacrange formulas.** **5. Use trigonometric analysis by using matrices to solve.** **6. Use general and special methods to find the solution to a system of linear equations.** **7. Using matrices in special methods for solving, such as the special Jacobi method and the special Kaus-Seidel method**
Indicative Contents	Part A - Sources of errors Cramer's method (practical examples - practical program), Newton Raphson's method for solving a system of nonlinear equations using the Jacobi matrix (algorithm - flow chart - applied examples - practical program in Mathlab) . [10 hours] The improved Newton-Raphson method for solving a system of nonlinear equations (algorithm - flow chart - applied examples - practical program in Mathlab), - using numerical analysis to solve the linear system indirectly. [10 hours] Trigonometric analysis method (explanation of the method - applied examples) - Jacobi's general method (explanation of the method - applied examples, practical program in Mathlab language) - Jacobi's special (trigonometric) method (explanation of the method - applied examples, a practical program in the Mathlab language) [20 hours] General Chaos-Seidel method (explanation of the method - applied examples, practical program in Mathlab language) - Chaos-Seidel's own method (explanation of the method - practical examples, a practical program in the Mathlab language. [15 hours]

	- Inclusion and completion Polynomials (quadratic inclusion, cubic inclusion) - Lagrangian Inclusion Parametric (explanation of the method, example, practical program in Mathlab language) [20 ساعة] .

Learning and Teaching Strategies	
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 educational programs and by considering the types of computer programs that benefit the student.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	4 ,8 and 10	LO #1, #2 and #5, #6
	Assignments	1	5% (5)	6	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2, #4and #6
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)

	Material Covered
Week 1	Cramer's method (practical examples - practical program)
Week 2	Newton Raphson's method for solving a system of nonlinear equations using the Jacobi matrix (algorithm - flow chart - applied examples - practical program in Mathlab)
Week 3	The improvement Newton-Raphson method for solving a system of nonlinear equations (algorithm - flow chart - applied examples - practical program in Mathlab)
Week 4	-Trigonometric analysis method (explanation of the method - applied examples)
Week 5	Jacobi's general method (explanation of the method - applied examples, a practical program in the Mathlab language
Week 6	Jacobi's special (trigonometric) method (explanation of the method - applied examples, a practical program in the Mathlab language)
Week 7	General causs-Seidel method (explanation of the method - applied examples, practical program in Mathlab language)
Week 8	Mid-term Exam

Week 9	- causs-Seidel's method practical (explanation of the method - applied examples, practical program in Mathlab language)
Week 10	- Inclusion and interpolation: polynomials (quadratic inclusion, cubic inclusion)
Week 11	Inclusion and interpolation: polynomials (quadratic inclusion, cubic inclusion)
Week 12	Solutions to the numerical methods problems above
Week 13	Lagrange Inclusion Parametric (Explanation of the method, example, practical program in Mathlab language
Week 14	Solutions to the numerical methods problems above
Week 15	Solutions to the numerical methods problems above
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Review of Mathlab programs
Week 2	Cramer method programming
Week 3	Programming the triangle analysis method
Week 4	Programming the public and private Jacobi method
Week 5	General causs-Seidel method programming
Week 6	Special causs- seidel method programming
Week 7	Lagrange method programming

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	حسون الدلفي و محمود عطا الله مشكور"التحليل الهندسي goodحسن م والعددي التطبيقي".	Yes
Recommended Texts	Fast algorithms for solving a system of linear equations Math and logic	No
Websites	https://www.bacldung.com/cs/category/core-concepts/math-logic)	

Grading Scheme

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Assignment problems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OR209**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	**UGII**		**Semester of Delivery**		**4**
Administering Department	**OR209**		**College**	**CSM**	
Module Leader	Ghalya tawfeeq basheer		**e-mail**	ghalia.tawfeek@uomosul.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**27/1/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1- Identify the different types of transportation and assignment problems. 2- Developing drafting skills in transportation models and finding optimal solutions. 3- Understand the basics in the field of transportation and assignment. 4- How to formulate the transportation and assignment problems. 5- Understanding ways to solve various transportation and assignment problems. 6- Using the Hungarian method to solve assignment problems.

	7- How to solve unbalanced problems. 8- Understand the solution of assignment problems related to profit maximization. 9- Understand the types of assignment problems. 10- Identify the Travelling salesman problem and methods to solve it.
Module Learning Outcomes	1. The use of transportation and assignment models in industry and business. 2. Formulating the transportation and assignment problems. 3. Knowledge of the assignment problem and its assumptions. 4. Solve the assignment problem using the Hungarian method. 5. Know and determine whether the optimal solution includes alternative or multiple solutions. 6. How to deal with the state of degenerate and imbalance in transportation and assignment problems. 7. Application of transportation and assignment models in business and real-life application. 8. Recognize the importance of transportation and assignment problems in solving practical problems in industry and production. 9. Interpret solutions of transportation and assignment models and derive solutions to real-world problems. 10. Keeping pace with developments in the field of specialization.
Indicative Contents	Part A - The transportation problem Basic concepts, transportation problem, methods for solving transportation problems, optimality test, applied examples. Part B - The assignment problem Basic concepts, methods for solving the assignment problem, special cases, formulation of the assignment matrix, types of assignment problems, applied examples. Part C – The Travelling Salesman Problem Basic concepts, description of the problem, mathematical model, applied examples.

Learning and Teaching Strategies	
Strategies	The main strategy adopted in delivering this unit is to encourage students to engage in exercises, while simultaneously enhancing and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials, and by exploring simple experiments that include some sampling activities of interest to students.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	150		

Module Evaluation					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**4**	**20% (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.			**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	**3hr**	**50% (50)**	**16**	**All**
Total assessment			**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Transportation Problems (Models) Definitions and basic concepts, formulation of the transportation problem (model), mathematical model
Week 2	Methods for finding the feasible basic solution to the transportation problem North west corner method, least cost method
Week 3	Vogel's method
Week 4	Methods for finding the optimal solution to the transportation problem (optimality test) Multipliers Method
Week 5	Stepping Stone Method
Week 6	Assignment Problems Definitions, basic concepts and applications
Week 7	Methods of solving assignment problems complete enumeration method
Week 8	Hungarian Method
Week 9	Linear programming method, Transportation method
Week 10	Special cases of assignment problems Maximization Problems
Week 11	Unbalanced Problems Handing unaccepted Assignment
Week 12	A job-Assignment Problem
Week 13	Formulating the assignment matrix
Week 14	Standard assignment problem (typical)

Week 15	Travelling Salesman Problem Basic concepts, Traveling salesman idea, mathematical model, applications
Week 16	A week of preparation before the final exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	P.K. Gupta & D.S.Hira,2008,Operations Research, S.Chand & Company Ltd. New Delhi	Yes
Recommended Texts	1) الجواد، دلال صادق ، الفتال ، حميد ناصر ،2008، بحوث العمليات ،دار اليازوري العلمية للنشر والتوزيع، عمان الأردن . 2) Rainer Burkard ; Mauro Dell'Amico and Silvano Martello,2009, Assignment Problems, SIAM.	No
Websites	https://www.youtube.com/watch?v=rfu2Zbjc7q8 https://www.youtube.com/watch?v=zhGdKrS_G38 https://www.youtube.com/watch?v=PFRa3ZnFID8	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Reliability Theory**			**Module Delivery**	
Module Type	**Basic**			☒ Theory ☒ Lecture Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**OR210**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	**UGII**		**Semester of Delivery**		**4**
Administering Department	**OR**		**College**	**CSM**	
Module Leader	**Ahmed Naziyah alkhateeb**		**e-mail**	**ahmed.alkhateeb@uomosul.edu.iq**	
Module Leader's Acad. Title	**lecturer**		**Module Leader's Qualification**		**MSc.**
Module Tutor	**Ahmed Naziyah alkhateeb**		**e-mail**	**ahmed.alkhateeb@uomosul.edu.iq**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	2025/01/23		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	develop students' skills in relation to the subject: 1. study of the reliability of the machines and the amount of time to reach the state of failure of the machine 2. and the study of probability distributions related to failure, as well as, identifying its reliability 3. study the methods of estimating reliability
Module Learning Outcomes	1. Calculating the reliability function used in evaluating the performance of machines and systems 2. Knowledge of the failure function and the risk function and their relationship with the reliability function

	3. recognize the amount of time to reach the state of failure of the machine 4. recognize the bath-tub in reliability 5. Knowledge of probability distributions related to failure models and calculate their reliability 6. Knowledge of systems, their types, and calculating their reliability 7. Know the methods of estimating reliability 8. Accuracy in analysis and decision making
Indicative Contents	Indicative content includes the following. Reliability function, Failure Rate, Average Failure Rate , relationship of reliability and failure function and Failure Rate, Design life, Mean time to Failure, median time to failure, Conditional reliability, Bath tub carve . [20 hr] Failure Models:[20 hr] Exponential failure Model: reliability function , Failure function , hazard function, , Design life, Mean time to Failure, median time to failure, memory lessness. Weibull Failure Model: reliability function , Failure function , hazard function, , Design life, Mean time to Failure, median time to failure. Gamma Failure Model: reliability function , Failure function Normal Failure Model: reliability function , Failure function , hazard function System Reliability : [20 hr] Series system, Parallel system, Series –parallel system, K out of n system independent components, Complex configurations.

Learning and Teaching Strategies	
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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation

		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	4	20% (20)	2 and 12	LO #3, #4 and #6, #7, #9
	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	Introduction and Overview
Week 2	Reliability function – Failur function – hazard function

Week 3	The relationship between Reliability function ,Failur function , hazard function
Week 4	Time to Failure Distribution (Some Well – Known Failure Model)
Week 5	Mean time to failure – median time to failure- Design life
Week 6	Bath tub carve
Week 7	Mid-term Exam +Conditional reliability
Week 8	Exponential Failure Model : reliability function - Failur function – hazard function…
Week 9	Gamma Failure Model: reliability function - Failur function – hazard function…
Week 10	Weibull Failure Model: reliability function - Failur function – hazard function..
Week 11	Normal Failure Model: reliability function - Failur function – hazard function…
Week 12	Reliability of System: Series system- Parallel system
Week 13	Series –parallel system
Week 14	K out of n system independent components
Week 15	Complex configurations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	مكان النشر والناشر: ;*الاحصاء الرياضي* :المؤلف *;امير حنا هرمز* الموصل:جامعة الموصل; تاريخ النشر: 1990; عدد الصفحات: 704ص	Yes
Recommended Texts	Ebeling; C. E. "An Introduction to Reliability and Maintainability Engineering"; 2009 Zacks ,s.,” Introduction to Reliability Analysis probability Models and statistical methods “,1992 Al – Nasser; Abdul Majeed "**Statistical Reliability**", 2009	No
Websites	https://www.sciencedirect.com/topics/computer-science/reliability-theory	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Game Theory**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	OR211				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	**2**		**Semester of Delivery**	4	
Administering Department	**OR**		**College**	CSM	
Module Leader	Dr.Mohammed Ahmed Alkailany		**e-mail**	**alkailanym@uomosul.edu.iq**	
Module Leader's Acad. Title	**Lecture**		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	2/02/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This course aims to introduce students to solving cooperative and non-cooperative game models, especially when time, cost, and quality are important factors in the solution.
Module Learning Outcomes	• The student should write some terms. • The student should describe the model.

	• The student should distinguish between models. • The student should explain the mathematical formulation. • The student should summarize the steps for solving the mathematical formulation. • The student should present a real-world problem. • The student should compare solution methods. • The student should rearrange the solution method. • The student should plan how to use the appropriate method for solving. • The student should apply the model to a real-life case. • The student should identify errors in the model. • The student should tabulate the results.
Indicative Contents	The guide content includes the following: **1. Principles and Concepts of Game Theory** • Covers game components and elements, along with definitions and examples of each. • **Duration: 15 hours** **2. Types of Games and Their Solutions** • Introduction to dynamic games, static games, Bayesian games, fuzzy games, and differential games. • **Duration: 15 hours** **3. Minimax Method, Game Value, and Saddle Point** • Understanding how to apply these three principles and find the equilibrium point. • **Duration: 30 hours** **4. Cooperative Games and Their Solutions** • These games involve agreements or contracts between competing players. • Solution methods include **Nash approach, elimination method, and probability method** in cooperative games. • **Duration: 15 hours** **5. Nash Equilibrium Approach**

- This approach is used when the **payoff matrix size is 3×3**.
- **Duration: 4 hours**

6. Elimination Method

- This method is used to **reduce the size of the payoff matrix** and reach the equilibrium point.
- **Duration: 4 hours**

7. Cooperative Probability Method

- Used when the **payoff matrix size is 2×2**.
- **Duration: 4 hours**

8. Non-Cooperative Games

- Games that **do not rely on agreements** between players, where competition is complete—**one player's loss equals the other player's gain** and vice versa.
- **Duration: 4 hours**

Solution Methods for Non-Cooperative Games

9. Arithmetic Method

- Used when the **matrix size is 2×2**.
- **Duration: 4 hours**

10. Algebraic Method

- Used when the **payoff matrix is 3×3 and square**.
- **Duration: 4 hours**

11. Graphical Method

- Used when **one of the rows or columns is two, while the other is greater than two**.
- **Duration: 4 hours**

12. Linear Programming Method

- Used **if all previous methods fail**.
- **Duration: 18 hours**

Learning and Teaching Strategies	

Strategies	**Motivating and Encouraging Students to Understand the Role of Game Theory in the Evolving Knowledge Society**
	
	The goal is to help students become aware of the **scientific applications of competitive game theory using computers** through the following steps:
	
	1. **Identifying Scientific Concepts and Principles**
	   - Presenting them in the form of a **question or problem** to stimulate curiosity and engagement.
	2. **Preparing the Necessary Educational Materials**
	   - Ensuring all **resources and tools** required for lesson execution are available.
	3. **Formulating the Problem into Sub-Questions**
	   - Encouraging learners to develop **hypothesis formulation skills** by breaking down the main issue into smaller investigative questions.
	4. **Defining Discovery Activities or Experiments**
	   - Designing activities that allow students to **explore concepts and verify outcomes** through hands-on experiences.
	5. **Assessing Learners and Helping Them Apply Their Knowledge**
	   - Providing **evaluations and guidance** to ensure students can implement what they have learned in real-world situations

Student Workload (SWL) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	3	15% (15)	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	Principles and Concepts of Game Theory
Week 2	Game Elements and Classification
Week 3	Types of Games and Solution Methods
Week 4	Two-Person Game Model
Week 5	Minimax Method, Game Value, and Saddle Point

Week 6	Pure Strategy, Convergence Point, and Game Analysis
Week 7	Multiple Saddle Points
Week 8	Non-Zero-Sum Game Model
Week 9	Cooperative Games and Their Solutions
Week 10	Nash Equilibrium Approach
Week 11	Elimination Method
Week 12	Cooperative Probability Method
Week 13	Solution Methods for Non-Cooperative Games
Week 14	Arithmetic Method
Week 15	Joint Probability Method
Week 16	Algebraic Method

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	non
Week 2	non

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Operation Research (2011) Gupta	Yes
Recommended Texts	مقدمه في بحوث العمليات 2010 حمدي طه	No
Websites	https://www.gametheory.net	

Grading Scheme				
Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
	A - Excellent	**excellence**	90 - 100	Outstanding Performance

Success Group (50 - 100)	**B -** Very Good	**Very good**	80 - 89	Above average with some errors median
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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

Module Information					
Module Title	**Arabic Language 2**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2012**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level		UGI	**Semester of Delivery**		4
Administering Department		OR	**College**	CSM	
Module Leader	م.م. مروة عدنان إسماعيل		**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			**e-mail**		
Scientific Committee Approval Date		1/02/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	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	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 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) For 15 weeks			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2

Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

		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

	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

Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors
	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings

	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	**Failed**	(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

Module Information					
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	**UGI**		**Semester of Delivery**	4	
Administering Department	**OR**		**College**	**CMS**	
Module Leader	**Neaam Hazem alfahady**		**e-mail**	**Neam.alfahady@uomosul.edu.iq**	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	**Ph.D.**	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	**1/02/2025**		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	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	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	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	
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) For 15 weeks			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**100**		

Module Evaluation

		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)

	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.
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.
Week 12	Applications and Tools of Al(Cont.): Finance, Robotics and Automation Technologies.

Week 13	AI and Society: How AI affects social, AI and international relations, AI and the future of humanity.
Week 14	The Future of AI: Future trends in AI, recent research and emerging technologies.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Lab 1	applications

Learning and Teaching Resources

	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

Group	**Grade**	**Appreciation**	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	**excellence**	90 - 100	Outstanding Performance
	B - Very Good	**Very good**	80 - 89	Above average with some errors
	C - Good	**good**	70 - 79	Sound work with notable errors

	D - Satisfactory	**median**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**accepted**	50 - 59	Work meets minimum criteria
Fail Group **(0 – 49)**	**FX –** Fail	**Failed (in process)**	(45-49)	More work required but credit awarded
	F – Fail	**Failed**	(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.

Course Description Form for the Academic Year 2024-2025

Department of Operations Research and Intelligence Technologies/College of Computer Science and Mathematics

For the Remaining Two Years of the Course System

Stage 3 Course 1

Course Description Form

1. Course Name: unconstrained optimization (1)

2. Course Code: CMOR23-F3111

3. Semester / Year:

4. Description Preparation Date:27/1/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4 Hours / 3 Units

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

Name: Dr.Huda esam ahmed Email: **dr.hudaea@uomosul.edu.iq**
Name: Ghalya tawfeeq Basheer Email: ghalia.tawfeek@uomosl.edu.iq

8. Course Objectives

Providing the student with skills in solving unconstrai optimization problems with one variable using different methods	**• Finding optimal strategies** **• How to build a competitive mo** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the basic definition

A2-The student should write some optimization formulas

A3- The student should describe the method

A4- The student should distinguish between optimization methods

A5- The student explains the mathematical formula the method

A6- The student should summarize the steps to sol the method

B - Subject-specific skills

B1 - The student applies the method to a numerical problem
B2 - The student should reveal the error in the method.
B3 - The student tabulates the results

C- Thinking skills
C1- That the student chooses the best method.
C2-The student should compare the solution methods.
C3- That the student converts the method and steps for solving the problem from one form to another.
C4- To plan how to use the appropriate method in tl solution

D - General and transferable skills (other skills related to employability and personal development).
D1- That the student can discover errors himself an solve them.
D2- That the student improves the method used in t solution
D3- Enabling the student to analyze the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Basic concepts	Lecture and discussion	Observation
2	4	A	Taylor' s series expansions necessary and sufficiency conditions	Lecture and discussion	Observation
3	4	A&B	Statement of an optimization problem	Lecture and interrogation	(H.W)
4	4	A&B	one variable unconstrained optimization problems	Lecture problem solving	Written tests

5	**4**	B&C	**Concave and convex functions of one variable**	Lecture and discussion	Written tests
6	**4**	B&C	**Necessary and sufficient condition of one variable**	Lecture and discussion	Observation
7	**4**	B&C	**Dichotomous search method**	Lecture and discussion	Observation
8	**4**	B&C	**Interval halving method**	Lecture and discussion	Observation
9	**4**	A&B	**Fibonacci method**	Lecture and problem solving	Observation
10	**4**	B&C	**Golden section method**	Lecture and discussion	(H.W)
11	**4**	B	**Quadratic interpolation method**	Lecture and project	Observation
12	**4**	D	**Cubic interpolation method**	Lecture and discussion	(H.W)
13	**4**	A&B	**Newton's method**	Lecture and problem solving	Observation
14	**4**	A&C	**Quasi newton method**	Lecture and discussion	Observation
15	**4**	A&C	**Secant method**	Lecture and interrogation	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any) Operation Research (2011) gupta	
Main references (sources) Engineering optimization theo and practice (2009) Rao	Operation Research (20 gupta
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1. Course Name: Stochastic process(1)

2. Course Code: CMOR23-F3121

3. Semester / Year

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 4 / Number of Units 3

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

Name: Hind talaat
Email: hindtalaat48@uomosul.edu.iq
hind talaat48@uomosul.edu.iq

8. Course Objectives

Course Objectives	
Introducing the student to the stochastic process and its characteristics • Enable the student to solve Markov chain models • Introducing the student to the simple and higher transitio probability matrix • Introducing the student to the concept of primary distribution and solving illustrative examples of it • Introducing the student to the properties of Markov chain • Enable the student to classify Markov chains and their states. • Introducing the student to the stationary distribution of Markov chains and solving examples of it	• **Finding optimal strategies** • **How to build a competitive model** • **Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should know the stochastic process and menti
its most prominent characteristics
A2- The student knows the Markov chain and cites an example t
explains it
A3- The student solves a Markov chain model
A4- The student should distinguish between the matrix of sim
and higher transitional probabilities
A5- The student should solve examples of the transitio
probability matrix
A6- State the characteristics of the Markov chain
A7- Find the stability distribution of the Markov chain
B - **Subject-specific skills**
B1 - To classify the given Markov chain
B2 - To classify the states of the Markov chain for the giv
transition matrix
B3 - The student should test whether the given Markov chain ha
stable distribution
C- Thinking skills
C1- The student solves a real-life problem using a Markov chain
C2- The student should compare the solution methods
C3- To rearrange the solution method
C4- To plan how to use the appropriate method in the solution
D - General and transferable skills (other skills related employability and personal development).
D1- That the student implements the method used in the proof
D2- That the student improves the method used in the solution
D3- To verify the method
D4- Enabling the student to solve the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Review of probability theory	Lecture and discussion	Assignments and Observation (H.W)
2	4	A	Definitions of stochastic processes . Specification of Stochastic processes .	Lecture and discussion	Assignments and Observation (H.W)

	3	4	A&B	Examples of stochastic processes Properties of stochastic process	Lecture and discussion	Assignments and Observation (H.W)
	4	4	A&B	Markov Chain . Definition and examples of Markov Chain .	Lecture and problem solving	Written tests
	5	4	B&A	The one and m-steps transition probabilities . Transition probability matrix with examples . Complete proof for the theorem about specification of homogenous Markov chain by its transition probability and the initial distribution	Lecture and problem solving	Written tests
	6	4	A & C	Introduction of Random walk Definition and examples of Random walk	Lecture and discussion	Assignments and Observation (H.W)
	7	4	B & C	**Mid-term Exam.** Higher transition probability .	Lecture and discussion	Assignments and Observation (H.W)
	8	4	A& C	Theorems for the n-th step transition matrix with two states (complete proof)	Lecture and discussion	Assignments and Observation (H.W)

			Derivation of chapman - kolmogrov equation .		
9	**4**	**B & C**	Initial distribution Theorem about Prob. distribution of the system or process after n-step later. Examples of initial distribution	Lecture and problem solving	Presentation (power point)
10	**4**	B	Transition Diagram & Transition Tree Classification of Chains accessible and communicate states with examples .	Lecture and discussion	Assignments and Observation (H.W)
11	**4**	D	Properties of communicate states . Irreducible chain , closed set of states , absorbing state, irreducible and reducible chain Remarks	Lecture and Project	Project(Report)
12	**4**	**A&B**	Examples of how to classify a Markov chain		
13	**4**	A &C	Classification of States	**Lecture and problem solving**	Assignments and Observation (H.W)

				Definitions of First Passage and mean recurrence time Recurrent and Transient states ,Positive and null recurrent periodic and aperiodic states , Ergodic with examples . Remarks		
	14	**4**	**A& C**	Examples of how to classify states of a Markov chain	Lecture and discussion	Assignments and Observation (H.W)
	15	**4**	C&D	Stationary distribution of a Markov chain . Definition of stationary distribution and theorem and examples	**Lecture and interrogation**	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Operation Research (20 gupta
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1− Course Name: fuzzy logic (1)

2− Course Code: CMOR24−F3131

3− Semester / Year: 3nd

4− Description Preparation Date:1/9/2024

5- Available Attendance Forms: In presence

6- Number of Credit Hours (Total) / Number of Units (Total) 4/3

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

Name: Neaam Hazim Ahmed
Email: neam.alfahady@uomosul.edu.iq

8− Course Objectives

Course Objectives	1-This course deals with the basic concept of fuzzy logic and classical logic. 2-Enabling the student to identify fuzzy logic. 3-To have a basic idea of the use of fuzzy logic and why 4-Recognize the types of fuzzy functions and their modeling with life problems and ways to use them.

9− Teaching and Learning Strategies

Strategy	A: Knowledge and understanding 1A- The student learns how to use fuzzy logic to find the expected value 2A- The student learns to find the fuzzy matrix of variables and the relationship betwee them 3A- The student learns how to use fuzzy matrices in daily life 4A- The student learns about the concept of the fuzzy system and its types. B- Subject-specific skills 1b- The student learns the concept of fuzzy sets and the relationship between them and classical sets. 2b- The student learns the relationship between fuzzy sets and how to deal with them. And how to benefit from them in reality.

3b- The student learns the fuzzy theory in making the best decision and using it in solving fuzzy equations.

4b- The student learns the fuzzy system, its types and its uses in the neighborhood of fuzzy equations.

C- Thinking skills

1c- The student learns how to determine the best method in fuz decision.

2c- The student applies fuzzy methods to real problems.

3c- The student learns fuzzy equations and how to find and use them.

4c- The student learns the fuzzy system and its parts and findin the best decision.

D - General and transferable skills
(other skills related to employability and perso development).

D1-The student implements different fuzzy methods.
D2- The student knows how to model the fuzzy equation.
D3- Write a computer program to find the fuzzy membership functions.
D4- Know the difference between the fuzzy membership functions and their uses.

10− Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A	Examples of classic sel	Lecture discussion	Lecture an discussio
2	3	A	Examples of discriminant function properties	Lecture discussion	Lecture an discussio
3	3	A&B	Application of fuzzy sets	Lecture discussion	Lecture an discussio
4	3	A&B	Organic function exercises the trapezius	Lecture problem solvi	Lecture an problem solv
5	3	**B&A**	Practical examples various forms of organic functions	Lecture problem solvi	Lecture an problem solv
6	3	**A & C**	Programming orga functions in MATLAB	Lecture discussion	Lecture an discussio
7	3	**B & C**	exam	Lecture discussion	Lecture an discussio
8	3	**A& C**	Examples of membership funct and group power	Lecture discussion	Lecture an discussio

9	3	**B & C**	Example of operations on fuzz sets	Lecture and problem solvi	Presentation (power point)
10	3	B	Practical examples of fuzzy organic functions	Lecture discussion	Assignment and Observat (H.W)
11	3	D	Programs for fuz examples		
12	3	**A&B**	Application of classical fuzzy relations	Lecture and Project	Project(Report)
13	3	A ,C&D	Example interrelationships fuzzy matrices	**Lecture problem solvi**	Assignment and Observat (H.W)
14	3	**A& C**	Example of fu mixing relationshi	Lecture discussion	Assignment and Observat (H.W)
15	3	C&D	exam	**Lecture interrogation**	TEST

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

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1 Kwang H. Lee, "First Course on Fuzzy Theory and Applications" S. N. Sivanandam, S. Sumathi and N. Deepa "Introduction to Fu Logic using MATLAB"
Recommended books and references (scientific journals, reports…)	Sources from the Internet
Electronic References, Websites	http://www.pattern recobnition . Pdf.

Course Description Form

1. Course Name: Intelligent Techniques (1)

2. Course Code: CMOR24-F3141

3. Semester / Year:First / 2025

4. Description Preparation Date: 23-1-2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4/3

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

Name: Assist. Prof. Dr. Niam Abdulmunim Abdulmajeed
Email: niam.munim@uomosul.edu.iq

8. Course Objectives

Course Objectives	Learn about the term artificial intelligence, its basic concepts, its compone and the various applications it includes to solve many problems. This course deals with research methods and search algorithms (or computer programs) that simulate human mental abilities or other behavioral patterns to give the computer the ability to learn and deduce situations that the machine has not learned. Learn about artificial intelligence algorithms (metaheuristics algorithms) and their applications to find the optimal solution in scientific and optimization research.

9. Teaching and Learning Strategies

Strategy	1. Knowledge in the field of artificial intelligence and intelligent technologies and their importance. 2. Employing intelligent technologies and artificial intelligence to serve society. 3. Introducing the applications of intelligent technologies. 4. Use search algorithms and intuitive and supra-intuitive algorithms. 5. The student graduates as Agent. Marathi output 6. Knowledge skills. 7. Memorization and analysis skills. 8. Skills for use and development. 9. Publishing research and participating in local and international conferences. 10. Participation in seminars and workshops. 11. Keeping pace with developments in the field of specialization. 12. Analysis of artificial intelligence technologies, benefits and challenges. 13. Enabling the student to write programs in artificial intelligence and its algorithms, solve problems, interpret res and be able to make the optimal decision in using algorithms in operations research and optimization.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		Artificial Intelligence, basic definitions and concepts Simon-Noel model, data, information and knowledge	Lecture, discussion and interrogation	written tests
2	4		representing knowledge by logic Logical deduction, semantic networks	Lecture, discussion and interrogation	written tests
3	4		Search Methods Basic concepts with examples	Lecture, discussion and interrogation	written tests
4	4		Water Jug Problem 8-Puzzle Problem	Lecture, discussion and interrogation	written tests
5	4		Search Strategies Basic concepts	Lecture, discussion and interrogation	written tests
6	4		Blind Search Algorithms – basic concepts Depth-First Search Algorithm – Basic concepts with examples Apply Depth-First search algorithm to 8-puzzle problem	Lecture, discussion and interrogation	written tests
7	4		Breadth-First Search Algorithm – Basic concepts with examples	Lecture, discussion and interrogation	written tests
8	4		Apply Breath-First search algorithm to 8-puzzle problem	Lecture, discussion and interrogation	written tests
9	4		Heuristic Search Algorithms Hill Climbing Algorithm	Lecture, discussion and interrogation	written tests
10	4		Apply Hill Climbing algorithm to 8-puzzle problem	Lecture, discussion and interrogation	written tests
11	4		Best-First Search Algorithm Apply Best-First Search algorithm to 8-puzzle problem	Lecture, discussion and interrogation	written tests
12	4		A^* Algorithm Game Playing algorithms MINIMAX Algorithm Alpha-Beta Pruning Algorithm	Lecture, discussion and interrogation	written tests
13	4		Machine learning Machine learning models	Lecture, discussion and interrogation	written tests

14	4		Machine learning classifications Machine learning algorithms	Lecture, discussion and interrogation	written tests
15	4		A week of preparation before the final exam		

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W.)

12. Learning and Teaching Resources

Required textbooks (curricular books, if a	Artificial Intelligence: A Modern Approach ,2021(Pearson Series in Artificial Intelligence) 4th Edition, Kindle Edition
Main references (sources)	S.sumathi&Surekha P.,2010,Computational Intelligence Paradigms Theory Applications Using MATLAB,CRC Press.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.youtube.com/watch?v=qv0iE8nmxRU

Course Description Form

1. Course Name: Inventory Model (2)

2. Course Code: **CMOR23-F4121**

3. Semester 1 / 2025

4. Description Preparation Date:1/2/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (4) / Number of Units (2)

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

Name: Dr. Mohammed Ahmed Al-Kailany
Email: alkailanym@uomosul.edu.iq

Name: A.P. Othman Attya Wardy
Email: othman.attya@uomosul.edu.iq

8. Course Objectives

5. Introduction to Inventory Models
6. Characteristics of Inventory Models

7. Efficiency Metrics of Inventory Models
8. Types and Classifications of Inventory Models
9. Supply and Consumption Processes in Inventory
10. Two Different Inventory Management Models: Economic Order Quantity (EOQ) Model and Reorder Point (ROP) Model
11. The Core Concept of Inventory Models That Integrates Different Types of Inventory Models
12. Developing Problem-Solving Skills in Inventory Management Through Applying Equations to Solve Practical Examples, Such as Calculating the Optimal Order Quantity or Determining the Reorder Point.

13. Teaching and Learning Strategies

A- Knowledge and Understanding

- A1: The student should recall previous formulas.
- A2: The student should write some key terms.
- A3: The student should clearly describe the model.
- A4: The student should distinguish between different models.
- A5: The student should explain the mathematical formula used.
- A6: The student should summarize the steps for solving the mathematical formula.

B- Subject-Specific Skills

- B1: The student should apply the model to a real-world case.
- B2: The student should identify errors in the model.
- B3: The student should organize the results in a structured table.

C- Thinking Skills

- C1: The student should present a real-world problem.
- C2: The student should compare different solution methods.
- C3: The student should rearrange the solution approach to improve results.
- C4: The student should plan the use of an appropriate solution method.

D- General and Transferable Skills (Other Skills Related to Employability and Personal Development)

- D1: The student should implement the adopted method with proof.
- D2: The student should enhance the chosen solution method.
- D3: The student should verify the correctness of the applied method.
- D4: The student should be able to accurately solve and interpret the results.

14. Course Structure

Week	Hours	Learning Outcomes	Unit/Topic Name	Teaching Method	Assessment Method
1	4	A	Inventory Definition and General Overview	Lecture & Discussion	Observation
2	4	A	Inventory Objectives, Concepts, and Inventory Control Assumptions	Lecture & Discussion	Observation
3	4	A, B	Inventory System Concepts and Characteristics, Storage Types	Lecture & Questioning	Oral Exams

4	4	A, B	Cost Definitions: Unit Cost, Setup Cost, Shortage Cost	Lecture & Problem Solving	Written Exams
5	4	B, C	Safety Stock, Lead Time, Holding Cost	Lecture & Discussion	Observation
6	4	B, C	Order Quantity and Reorder Point	Lecture & Discussion	Observation
7	4	B, C	Demand in Inventory Models and Inventory Model Classification	Lecture & Discussion	Observation
8	4	D	Deterministic Inventory Models	Lecture & Discussion	Observation
9	4	A, B	Purchase Model Without Shortages	Lecture & Problem Solving	Presentation
10	4	B, C	Purchase Model With Shortages	Lecture & Discussion	Observation
11	4	B	Purchase Model Without Shortages (Exercises & Solutions)	Lecture & Project	Project
12	4	A, B	Purchase Model With Shortages (Exercises & Solutions)	Lecture & Problem Solving	Observation
13	4	A, C	Fixed and Determined Demand for a Single Item	Lecture & Discussion	Observation
14	4	A, C	Reorder Point	Lecture & Questioning	Exams
15	4	C, D	Reorder Point During Lead Times	Discussion	Homework
16	-	-	Preparation Week Before the Final Exam	General Review	-

15. Course Evaluation

- Written tests
- Project(Report)
- Presentation (power point)
- Assignments and Observation (H.W)

16. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	[1] "Operations and Production Management" – A book to support theoretical concepts. [2] "Operation Research" by Prem Kumar Gupta and D.S. Hira. Al-Shamrati, Hamed Saad Noor, & Al-Zubaidi, Ali Khalil (2007). Introduction to Operations Research. Hashemite Kingdom of Jordan: Majd Alawi Publishing & Distribution.
Recommended books and references	1- Samanta, G. P. (2016). "A production inventory model with deteriorating items & shortages". Yugoslav Journal of Operations Research, 14(2). 2- Alfares, H. K. (2014)." Production-inventory system with finite production

(scientific journals, reports...)	rate, stock-dependent demand, & variable holding cost". RAIRO – Operations Research, 48(1), 135-150. https://doi.org/10.1051/ro/2013058
Electronic References, Websites	1. **APICS (Association for Supply Chain Management)** o Website: https://www.apics.org o Description: APICS offers certifications, training, and resources on inventory management and supply chain practices. 2. **MIT OpenCourseWare - Supply Chain Management** o Website: https://ocw.mit.edu o Description: Free online courses from MIT that cover inventory management as part of supply chain topics. 3. **Investopedia - Inventory Management** o Website: https://www.investopedia.com o Description: Provides definitions and explanations of key inventory management concepts like EOQ, JIT, and ABC analysis. 4. **Harvard Business Review (HBR) Articles** o Website: https://hbr.org o Search for articles on inventory management, supply chain optimization, and related topics. 5. **Coursera and Udemy Courses** o Platforms: https://www.coursera.org | https://www.udemy.com o Description: Online courses on inventory management, supply chain, and logistics offered by universities and industry experts. **Software Tools for Inventory Management** 1. **SAP ERP** o Website: https://www.sap.com o Description: Enterprise resource planning software with robust inventory management features. 2. **Oracle NetSuite** o Website: https://www.netsuite.com o Description: Cloud-based inventory and supply chain management software. 3. **Fishbowl Inventory** o Website: https://www.fishbowl.com o Description: A popular inventory management solution for small and medium-sized businesses. 4. **TradeGecko (now QuickBooks Commerce)** o Website: https://www.tradegecko.com o Description: Inventory and order management software for e-commerce businesses. 5. **Zoho Inventory** o Website: https://www.zoho.com/inventory

Course Description Form

1. Course Name: Regression Analysis (1)

2. Course Code: **CMOR23-F3161**

3. Semester / Year: first course

4. Description Preparation Date: 1/2/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 3 / Number of Units (Total): 2

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

Name: Salih Mooaed Shaker
Email: salih.mooaed@uomosul.edu.iq

8. Course Objectives

Course Objectives	• **Determine relationships between variab** • **Estimate regression parameters** • **Prediction of the estimated model** • **Controlling dependent variables**

9. Teaching and Learning Strategies

Strategy	1- Identify the concepts of regression analysis 2- Determine the analysis hypotheses 3- Data modeling and analysis using estimation methods 4- Characteristics of capabilities 5- Create a variance analysis table 6- Identify the formation of confidence limits and the path of the regressi line 7- Identify the correlation coefficient and the coefficient of determination 8- Testing hypotheses and identifying deviations in analysis assumptions 9- Testing the extent to which the model matches the data 10- Testing homogeneity and independence of errors

10. Course Structure

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

1	3	1	Definition of regression analysis, u and causal relationships	Lecture and discussi	watching
2	3	2	Analysis assumptions that must be met In the linear model	Lecture and discussi	watching
3	3	3 و4	Estimating regression parameters a the characteristics of capabilities	Lecture and exercise	watching
4	3	5	Hypothesis testing and table Analy of variance	Lecture and exercise	watching
5	3	6	Estimate confidence intervals.	Lecture and exercise	Oral exams
6	3	6	Regression through the origin	Lecture and exercise	watching
7	3	7	Coefficient of determination and correlation coefficient Simple and its characteristics	Lecture and exercise	watching
8	3	7	Correlation coefficient: its relationship to the regression coefficient	Lecture and exercise	watching
9	3	8	Violations and defects in the analy assumptions	Lecture and exercise	watching
10	3	8	Test whether the analysis hypothes Generally available	Lecture and exercise	Written tests
11	3	9	Test whether the relationship between... Variables X and y linear	Lecture and exercise	watching
12	3		Mid-course exam		
13	3	9	Lack of fit test	Lecture and exercise	watching
14	3	10	Test whether the error variance Stable and homogeneous	Lecture and exercise	watching
15	3	10	Test whether the errors are independent	Lecture and exercise	watching

11. Course Evaluation

Written tests
the report
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Al-Rawi, Khashi Mahmoud, 1987, Introduction Regression Analysis, University of Mosul, Iraq.
Main references (sources)	1-Draper, N. R. and Smith H. 1981. Applied Regress Analysis, 2nd.ED.
Recommended books and references (scientific journals, reports...)	Richard B. Darlington & Andrew F. Hayes. (2017). “Regression Analysis and Linear Models”, The GUILFORD PRESS, New York London.
Electronic References, Websites	https://www.coursera.org/learn/predictive-modeling-mod fitting-regression-analysis

Course Description Form

1. Course Name: English Language

2. Course Code: CMOR23-F3171

3. Semester / Year:3 rd

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

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

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

Name: Zainab Qusay Ahmed Taqy ALOraibi
Email: Zainab.q@uomosul.edu.iq

8. Course Objectives

Course Objectives	
• To be able to speak English. • To be able to compose freely and independently in spee and writing. • To be able to read books with understanding	• **Finding optimal strategies** • **How to build a competitive model** • **Market competition rules**

9. Teaching and Learning Strategies

A- Speaking skill
A1- He must have the ability to think and speak in English
A2- The ability to speak English fluently
A3- The ability to formulate sentences correctly
B - Reading skill
B1 - The ability to read sentences correctly
B2 - Correct pronunciation of words.
C- Writing skill
C1- The ability to write sentences in English correctly
The ability to express ideas through writing
D - Listening skills.
D1- Developing the student's listening skill
D2-The ability to distinguish words while listening

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	2	A	Introduction: about study materials of Headway Pre-intermediate Plus.	Lecture and discussion	Assignments and Observation
2	2	A, B, D	Grammar: Have (got) to, practices.	Lecture and discussion	Assignments and Observation
3	2	A, B, D	Should/must, questions and answers. Reading.	Lecture and discussion	Assignments and Observation
4	2	A, B	Vocabulary: words that go together, everyday English at the doctor.	Lecture	Written tests
5	2	**A, D**	Grammar: verb patterns and infinitives, practices.	Lecture and problem-solving	Assignments and Observation
6	2	**A, D**	Time and conditional clauses, practices (when, as soon as). listening and speaking/ life in 2050.	Lecture and discussion	Assignments and Observation
7	2		Mid-term Exam		
8	2	**B, D**	Reading and speaking/ the world's first megalopolis.	Lecture and discussion	Assignments and Observation

9	**2**	**B, C**	Vocabulary: Hot verbs/ take- get- do and make.	Lecture and problem-solving	Assignments and Observation
10	**2**	B	Vocabulary: -ed/ -ing adjective, reading about (Into the wild).	Lecture and discussion	Assignments and Observation
11	**2**	**A, D**	Expressions about exclamations with so and such.	Lecture and discussion	Assignments and Observation
12	**2**	**A, B**	Grammar: actives and passives voice, practices.		
13	**2**	**A, C**	Verbs and nouns that go together, practices.	**Lecture and problem– solving**	Assignments and Observation
14	**2**	**A, B**	Reading: about the discovery of DNA., expressions about(notices).	Lecture and discussion	Assignments and Observation
15	**2**	**D, C**	Study material review	**Lecture**	Observation

11. Course Evaluation

Written tests
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (Headway pre-intermediate plus student's book (john and l Soars))	
Main references (Headway pre-intermediate plus work's book)	Operation Research (20 gupta
references (scientific journals, reports…)	

Websites https://7esl.com/ , https://worldenglishblog.com/hasnt-vs-doesnt-have-pd	www.gametheory.net

Stage 3 Course 2

Course Description Form

1. Course Name: unconstrained optimization (2)

2. Course Code: CMOR23-F3211

3. Semester / Year:2nd

4. Description Preparation Date:27/1/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4 Hours / 3 Units

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

Name: Dr.Huda esam ahmed Email: **dr.hudaea@uomosul.edu.iq**
Name: Ghalya tawfeeq Basheer Email: ghalia.tawfeek@uomosl.edu.iq

8. Course Objectives

Providing the student with skills in solv unconstrained multivariate optimization proble using different methods	**• Finding optimal strategies** **• How to build a competitive model** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the basic definitions
A2-The student should write some optimization formulas
A3- The student should describe the method
A4- The student should distinguish between optimization methods
A5- The student explains the mathematical formula of the method
A6- The student should summarize the steps to solve the method

B - Subject-specific skills

B1 - The student applies the method to a numerical problem
B2 - The student should reveal the error in the method.
B3 - The student tabulates the results

C- Thinking skills

C1- That the student chooses the best method.
C2-The student should compare the solution methods.
C3- That the student converts the method and steps for solving the problem from or form to another.

C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employability and personal development).

D1- That the student can discover errors himself and solve them.
D2- That the student improves the method used in the solution
D3- Enabling the student to analyze the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	**4**	A	**Multivariable unconstrained optimization**	Lecture and discussion	Observation
2	**4**	A	**Basic concepts**	Lecture and discussion	Observation
3	**4**	A&B	**Necessary and sufficient condition of Multivariable unconstrained optimization**	Lecture and interrogation	(H.W)
4	**4**	A&B	**Concave and convex of Multivariable unconstrained optimization**	Lecture problem solving	Written tests
5	**4**	B&C	**rth differential of function**	Lecture and discussion	Written tests
6	**4**	B&C	**Taylor's method**	Lecture and discussion	Observation
7	**4**	B&C	**Steepest descent method**	Lecture and discussion	Observation

	8	**4**	B&C	**Conjugate gradient method (FR)**	Lecture and discussion	Observation
	9	**4**	A&B	**Conjugate gradient method (HS)**	Lecture and problem solving	Observation
	10	**4**	B&C	**Conjugate gradient method (PR)**	Lecture and discussion	(H.W)
	11	**4**	B	**Newton's method**	Lecture and project	Observation
	12	**4**	D	**Marquardt method**	Lecture and discussion	(H.W)
	13	**4**	A&B	**Quasi newton method**	Lecture and problem solving	Observation
	14	**4**	A&C	**Davidon-Fletcher-Powell method**	Lecture and discussion	Observation
	15	**4**	A&C	**Broyden-Fletcher-Goldfarb-shanno method**	Lecture and interrogation	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if a	Operation Research (2011) gupta
Main references (sources) Engineeri optimization theory and practice (200 Rao	Operation Research (2011) gupta

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1. Course Name: Stochastic process(2)

2. Course Code: **CMOR23-F3221**

3. Semester / Year

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 4 / Number of Units (Total) 3

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

Name: Hind talaat
Email: hindtalaat48@uomosul.edu.iq
hind talaat48@uomosul.edu.iq

8. Course Objectives

Course Objectives

Enable the student to solve Markov chains using MATLAB
• Enable the student to solve the profit analysis problem and t
traveling salesman problem using the MATLAB program
• Introducing the student to the counting process, the Poiss
process, and its hypotheses
• Enable the student to solve problems related to the Poiss
process
• Introducing the student to the distributions associated w
the Poisson process with proof
• Introducing the student to the characteristics of the Poiss
process with proofs
• Enable the student to employ the characteristics of the Poiss
process in solving various problems of this process.
• Introducing the student to the heterogeneous Poisson proce

- **Finding optimal strategies**
- **How to build a competitive model**
- **Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- Write a program to calculate the transition matrix, solve the profit analy
problem, or solve the traveling salesman problem
A2- That the student knows the counting process and mentions its mo
prominent characteristics
A3- The student should know the Poisson process and mention its mo
prominent characteristics

A4- The student should mention the distributions associated with the Poiss process
A5- To compare the structure of the Poisson process and the difference betwe two Poisson processes, whether they follow the Poisson distribution or not.
A6- The student should mention when the Poisson distribution is the Binon distribution
A7- Explain the nonhomogeneous Poisson process

B - Subject-specific skills

B1 - The student must prove the distribution mechanism of the Poisson proce
B2 - The student should solve problems related to the homogeneous a heterogeneous Poisson process
B3 - To prove that the time between the occurrence of two Poisson distributi events is distributed exponentially
B4- Prove that the waiting time follows a kamma distribution

C- Thinking skills

C1- The student solves a real-life problem using the Poisson distribution
C2- The student should compare the solution methods
C3- To rearrange the solution method
C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employabil and personal development).

D1- That the student implements the method used in the proof
D2- That the student improves the method used in the solution
D3- To verify the method
D4- Enabling the student to solve the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Calculating the higher order transition matrix using MATLAB Calculate the initial distribution using MATLAB	Lecture and discussion	Assignments and Observation (H.W)

				A program to compute a Markovian chain consisting of numbers A program to calculate a Markovian chain consisting of symbols Explain the topic of profit analysis and write a program to solve the problem		
	2	**4**	A	Explain the subject of the traveling salesman problem and write a program for it Definition and examples about Counting Process	Lecture and discussion	Assignments and Observation (H.W)
	3	**4**	A&B	Poisson process . Assumption of Poisson Process. Derivation the P. d. f. of a Poisson process (complete proof) .	Lecture and discussion	Assignments and Observation (H.W)
	4	**4**	A&B	Examples of Poisson Process	Lecture and problem solving	Written tests
	5	**4**	**B&A**	Distributions Related with Poisson process Theorem about the interval time between two events of a Poisson	Lecture and problem solving	Written tests

			process has an exponential distribution (complete proof) .		
6	4	A & C	Theorem about the waiting time has gamma distribution (complete proof) .	Lecture and discussion	Assignments and Observation (H.W)
7	4	B & C	**Mid-term Exam** Properties of a Poisson process .	Lecture and discussion	Assignments and Observation (H.W)
8	4	A& C	Additive property (complete proof) . Difference of two independent Poisson process (complete proof)	Lecture and discussion	Assignments and Observation (H.W)
9	4	B & C	Decomposition of a Poisson process (complete proof)	Lecture and problem solving	Presentation (power point)
10	4	B	Poisson process and binomial distribution (with proof) .	Lecture and discussion	Assignments and Observation (H.W)

	11	**4**	D	Examples about the Properties of a Poisson process	Lecture and Project	Project(Report)
	12	**4**	**A&B**	Non –Homogeneous Poisson process. Exercises .		
	13	**4**	A &C	Some special stochastic processes Bernoulli Process Examples about Bernoulli Process	**Lecture and problem solving**	Assignments and Observation (H.W)
	14	**4**	**A& C**	Winer Process Examples about Winer Process	Lecture and discussion	Assignments and Observation (H.W)
	15	**4**	C&D	**Preparatory week before the final Exam**	**Lecture and interrogation**	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Operation Resear (2011) gupta
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1- Course Name: fuzzy logic (2)

2− Course Code: CMOR24-F3231

3− Semester / Year: 3nd

4− Description Preparation Date:1/2/2025

5- Available Attendance Forms: In presence

6- Number of Credit Hours (Total) / Number of Units (Total) 4/3

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

Name: Neaam Hazim Ahmed
Email: neam.alfahady@uomosul.edu.iq

8− Course Objectives

Course Objectives	1. This course deals with the basic concept of fuzzy number and its properties. 2. Enable the student to identify the organic functions of fuzzy number and their formation. 3. Form a basic idea about the use of fuzzy number and why? 4. Identify the types of fuzzy number and its arithmetic operations. 5. Modeling the organic functions of fuzzy number. 6. Explain some life problems and work on making decisions and solving their problems.

9− Teaching and Learning Strategies

Strategy	A: Knowledge and understanding 1A. The student knows the basic concept of fuzzy number and its properties. 2A. Identify the organic functions of fuzzy number and their formation. 3A. The student has a basic idea about the use of fuzzy number and why? 4A. The student recognizes the types of fuzzy number and its arithmetic operations. 5A. Can model the organic functions of fuzzy number B- Subject-specific skills 1b- The student learns the concept of fuzzy number and its application in daily life to solve problems. 2b- Modeling fuzzy life decisions with fuzzy number. 3b- The student learns the fuzzy theory in making the best decision and uses it in solving fuzzy equations. 4b- Transforming life problems and treating them using the idea of fuzzy logic.

	C- Thinking skills 1c- The student learns how to determine the best method in fuzzy decision. 2c- The student applies fuzzy methods to real problems. 3c- The student learns fuzzy equations and how to find and use them. 4c- The student learns the fuzzy system and its parts and finding t best decision. D - General and transferable skills (other skills related to employability and personal developmer D1- The student implements different fuzzy methods. D2- The student knows how to model the fuzzy equation. D3- Write a computer program to find fuzzy organic functions. D4- Know the difference between fuzzy organic functions a their use.

10− Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	A	Properties of fuzzy sets	Lecture discussion	Lecture and discussion
2	3	A	Properties of convex fuzz sets	Lecture discussion	Lecture and discussion
3	3	A&B	The concept of blurry per	Lecture discussion	Lecture and discussion
4	3	A&B	Properties of fuzzy sets	Lecture problem solvir	Lecture and problem solv
5	3	**B&A**	Properties of con fuzzy sets	Lecture problem solvir	Lecture and problem solv
6	3	**A & C**	The concept of blurry periods	Lecture discussion	Lecture and discussion
7	3	**B & C**	Fuzzy sets of fuzzy number	Lecture discussion	Lecture and discussion
8	3	**A& C**	Characteristics o mathematical operations in fuz periods	Lecture discussion	Lecture and discussion
9	3	**B & C**	Triangular Fuzzy Number	Lecture and problem solvi	Presentation (power point)
10	3	B	Operations with α-cut	Lecture discussion	Assignment and Observat (H.W)
11	3	D	Approximation Triangular Fuz Number		
12	3	**A&B**	Fuzzy and classical rul	Lecture and Project	Project(Report)

13	3	A ,C&D	Fuzzy inference system	**Lecture problem solvi**	Assignment and Observat (H.W)
14	3	**A& C**	Mamdani metho	Lecture discussion	Assignment and Observat (H.W)
15	3	C&D	exam	**Lecture interrogation**	TEST

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

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1 Kwang H. Lee, "First Course on Fuzzy Theory and Applications" S. N. Sivanandam, S. Sumathi and S. N. De "Introduction to Fuzzy Logic using MATLA
Recommended books and references (scientific journals, reports…)	Sources from the Internet
Electronic References, Websites	http://www.pattern recobnition . Pdf.

Course Description Form

1. Course Name: Intelligent Techniques (2)

2. Course Code: CMOR24-F3241

3. Semester / Year: Second / 2025

4. Description Preparation Date: : 23-1-2025

5. Available Attendance Forms: : In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4/3

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

Name: Assist. Prof. Dr. Niam Abdulmunim Abdulmajeed
Email: niam.munim@uomosul.edu.iq

8. Course Objectives

Course Objectives	1-Learn about algorithms inspired by nature, including evolutionary algorithms, swarm intelligence, basic concepts and components, and the various applications they contain to solve many problems. 2- This course deals with the genetic algorithm, its components, particle swarm optimization, and basic concepts. 3- Employing genetic algorithm, particle swarm optimization, and applications to find the optimal solution in optimization and operation research.

9. Teaching and Learning Strategies

Strategy	1. Knowledge in the field of intelligent techniques and algorithms. 2. Employing intelligent techniques to serve society. 3. The student has knowledge of individual intelligent agents for modeling industrial, social, and biological systems. 4. Use evolutionary algorithms and heuristic and metaheuristic algorithms. 5. The student graduates as Agent. 6. Knowledge of modeling evolutionary algorithmic agents and social swarm intelligence agents in complex designs and problems. 7. Knowledge of evolutionary algorithms and swarm intelligence inspired by different natural systems. 8. The student has skills in using and developing intelligent individual agents to solve optimization problems with complex structures. 9. The student has skills in developing simulation models based on swarms of intelligent agents or agents. 10. Skills in using evolutionary algorithms (genetic algorithm) and swarm intelligence algorithms to solve operations research problems and real optimization problems

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4		Evolutionary algorithms - definition of evolutionary algorithms, concept of genetic algorithm, idea of genetic algorithm, basic (biological) terms of genetic algorithm, basic steps of genetic algorithm, flow chart	Lecture, discussion and interrogation	written tests
2	4		Elements of genetic algorithm, encoding and its types with examples	Lecture, discussion and interrogation	written tests
3	4		Fitness Function with examples	Lecture, discussion and interrogation	written tests
4	4		Selection and selection methods with examples	Lecture, discussion and interrogation	written tests
5	4		Crossover and its types with examples	Lecture, discussion and interrogation	written tests
6	4		Mutation and its types with examples, stopping measures	Lecture, discussion and interrogation	written tests
7	4		Applications and examples of genetic algorithm in operations research and optimization Applications in Matlab	Lecture, discussion and interrogation	written tests
8	4		Swarm Intelligence – basic concepts, idea of swarm intelligence, historical development of swarm intelligence	Lecture, discussion and interrogation	written tests
9	4		Principles of collective behavior in swarms, types of swarm intelligence	Lecture, discussion and interrogation	written tests
10	4		Particle swarm optimization algorithm – definitions, idea of PSO	Lecture, discussion and interrogation	written tests
11	4		Advantages, disadvantages and applications of particle swarm optimization algorithm	Lecture, discussion and interrogation	written tests
12	4		Basic components of the particle swarm optimization algorithm, basic concepts of the particle swarm optimization algorithm	Lecture, discussion and interrogation	written tests
13	4		Parameters of the particle swarm optimization algorithm Basic steps and flowchart of particle swarm optimization algorithm	Lecture, discussion and interrogation	written tests
14	4		Applications and problems in operations research and optimization Applications in Matlab	Lecture, discussion and interrogation	written tests
15	4		A week of preparation before the final exam		

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W.)

12. Learning and Teaching Resources

Required textbooks (curricular books, if an	Lectures prepared by the lecturer
Main references (sources)	Xin-She Yang,2020, Nature-Inspired Optimization Algorithms, Second edit Elsevier.

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.youtube.com/watch?v=wQm9mFw02mU

Course Description Form

1. Course Name: (2)

2. Course Code: **CMOR23-F4121**

3. Semester

4. Description Preparation Date:1/4/2024

5. Available Attendance Forms: In presence

6. Number of Credit Hours (3) / Number of Units (2)

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

Name: Dr. Mohammed Ahmed Al-Kailany **Email**: alkailanym@uomosul.edu.iq	**Name**: M. Othman Attya Wardy **Email**: othman.attya@uomosul.edu.iq

8. Course Objectives

1. **Managing Orders and Costs:**
Inventory models deal with determining the optimal timing for placing orders and calculating the ideal order quantity while considering various factors, such as the cost of acquiring goods, the cost of holding one unit in inventory, and the potential cost of shortages. These models help achieve a balance between these costs to ensure efficient storage operations.
2. **Reducing Total Costs:**
The primary objective of studying inventory models is to identify the scientific principles and rules that enable management to reduce the total costs associated with the storage process. Through these models, management can improve decisions related to order quantities and replenishment periods, leading to lower storage and holding costs.
3. **Ensuring Operational Continuity and Customer Satisfaction:**
Inventory models help effectively meet customer demands while maintaining sufficient inventory levels to protect management from unexpected fluctuations in production or demand. This ensures the management's ability to respond quickly to customer orders, while determining the Economic Order Quantity (EOQ) that balances storage costs with market needs.

4. Teaching and Learning Strategies

A- Knowledge and Understanding

A1: That the student states the meaning of inventory and the purpose of studying storage systems.
A2: That the student writes down the costs related to inventory systems.
A3: That the student describes the meaning of demand in inventory models and its classifications.
A4: That the student distinguishes between types of inventory based on the type of material stored.
A5: That the student explains how to determine the economic order quantity and the reorder point.
A6: That the student summarizes the steps to determine the price break model.

A7: That the student states the types of inventory models (probabilistic models).
A8: That the student describes how to determine the economic order quantity in the continuous model.
A9: That the student distinguishes between the single-period model and the unified order setup cost, which equals zero.
A10: That the student explains the scientific method for controlling the distribution of ABC inventory.
A11: That the student summarizes the steps for studying the fixed model for multiple items, with the identification of shortage and form.

B- Subject-Specific Skills

B1: That the student applies the model to a real-life case.
B2: That the student identifies the error in the model.
B3: That the student presents the results in an organized table.

C- Thinking Skills

C1: That the student presents a real-world problem.
C2: That the student compares different problem-solving methods.
C3: That the student rearranges the solution approach to improve the results.
C4: That the student plans to use the appropriate method in solving the problem.

D- General and Transferable Skills (Other Skills Related to Employability and Personal Development)

D1: That the student implements the method used with evidence.
D2: That the student improves the approach used in the solution.
D3: That the student verifies the correctness of the method employed.
D4: That the student is enabled to solve the results accurately.

5. Course Structure

Week	Hours	Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	4	A	Introduction to Inventory and Overview	Lecture and Discussion	Observation
2	4	A	Objectives, Concepts, and Inventory Control	Lecture and Discussion	Observation
3	4	A, B	Concepts and Characteristics of Inventory Systems	Lecture and Questioning	Oral Tests
4	4	A, B	Probabilistic Model	Lecture and Problem Solving	Written Tests

5	4	B, C	Continuous Model	Lecture and Discussion	Observation
6	4	B, C	Single-Period Model	Lecture and Discussion	Observation
7	4	B, C	Zero Setup Cost Model	Lecture and Discussion	Observation
8	4	D	ABC Distribution	Lecture and Discussion	Observation
9	4	A, B	Spare Parts Planning and Management	Lecture and Problem Solving	Presentation
10	4	B, C	Objectives of Spare Parts Management	Lecture and Discussion	Observation
11	4	B	ABC Inventory Control Method	Lecture and Project	Project
12	4	A, B	Inventory Constraints	Lecture and Problem Solving	Observation
13	4	A, C	Multi-Unit Inventory Systems	Lecture and Discussion	Observation
14	4	A, C	Static Multi-Item Model with Shortage Constraints	Lecture and Questioning	Tests
15	4	C, D	Special Case: Single Inventory Constraint	Discussion	Assignments
16	-	-	Pre-Exam Preparation Week	General Review	-

6. Course Evaluation

- Written tests
- Project(Report)
- Presentation (power point)
- Assignments and Observation (H.W)

7. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	[1] "Operations and Production Management" – A book to support theoretical concepts. [2] "Operation Research" by Prem Kumar Gupta and D.S. Hira. Al-Shamrati, Hamed Saad Noor, & Al-Zubaidi, Ali Khalil (2007). Introduction to Operations Research. Hashemite Kingdom of Jordan: Majd Alawi Publishing & Distribution.
Recommended books and	3- Samanta, G. P. (2016). "A production inventory model with deteriorating

references (scientific journals, reports...)	items & shortages". Yugoslav Journal of Operations Research, 14(2). 4- Alfares, H. K. (2014)." Production-inventory system with finite production rate, stock-dependent demand, & variable holding cost". RAIRO – Operations Research, 48(1), 135-150. https://doi.org/10.1051/ro/2013058	
Electronic References, Websites	6. **APICS (Association for Supply Chain Management)** o Website: https://www.apics.org o Description: APICS offers certifications, training, and resources on inventory management and supply chain practices. 7. **MIT OpenCourseWare - Supply Chain Management** o Website: https://ocw.mit.edu o Description: Free online courses from MIT that cover inventory management as part of supply chain topics. 8. **Investopedia - Inventory Management** o Website: https://www.investopedia.com o Description: Provides definitions and explanations of key inventory management concepts like EOQ, JIT, and ABC analysis. 9. **Harvard Business Review (HBR) Articles** o Website: https://hbr.org o Search for articles on inventory management, supply chain optimization, and related topics. 10. **Coursera and Udemy Courses** o Platforms: https://www.coursera.org | https://www.udemy.com o Description: Online courses on inventory management, supply chain, and logistics offered by universities and industry experts. **Software Tools for Inventory Management** 6. **SAP ERP** o Website: https://www.sap.com o Description: Enterprise resource planning software with robust inventory management features. 7. **Oracle NetSuite** o Website: https://www.netsuite.com o Description: Cloud-based inventory and supply chain management software. 8. **Fishbowl Inventory** o Website: https://www.fishbowl.com o Description: A popular inventory management solution for small and medium-sized businesses. 9. **TradeGecko (now QuickBooks Commerce)** o Website: https://www.tradegecko.com o Description: Inventory and order management software for e-commerce businesses. 10. **Zoho Inventory** o Website: https://www.zoho.com/inventory	

Course Description Form

1. Course Name: Regression Analysis (2)

2. Course Code: **CMOR23-F3261**

3. Semester / Year: Second course

4. Description Preparation Date: 1/2/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 3 / Number of Units (Total): 2

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

Name: Salih Mooaed Shaker
Email: salih.mooaed@uomosul.edu.iq

8. Course Objectives

Course Objectives	**1-Define the multiple linear regression model** **2- Estimating regression parameters for the mult model** **3-Additional sum of squares control** **4-Methods for choosing the best regression equat**

9. Teaching and Learning Strategies

Strategy	1- Define the linear model 2- Parameter estimation, properties of estimators 3- Create a variance analysis table 4- Identify the multiple partial correlation coefficient and the standard part regression coefficient 5- Find the additional sum of squares 6- Methods for choosing the best regression equation 7- Significant or expressive variables 8- The case of a qualitative independent variable 9- Other multivariate methods 10- Path analysis

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1	**Matrices, linear model**	Lecture and discuss	watching
2	3	2	**Parameter estimation, properties estimators**	Lecture and discuss	watching
3	3	3	**Analysis of variance table**	Lecture and exercis	watching
4	3	4	**Partial multiple correlation coefficient And the standard parti regression coefficient**	Lecture and exercis	watching
5	3	5	**Additional sum of squares And the coefficient of partial determination**	Lecture and exercis	Oral exams
6	3	6	**Choose the best equation Regression using several criteria**	Lecture and exercis	watching
7	3	6	**Backword deletion method**	Lecture and exercis	watching
8	3	6	**Forward deletion method**	Lecture and exercis	watching
9	3	6	**Stepwise regression method**	Lecture and exercis	watching
10	3	8	**Significant or expressive variables**	Lecture and exercis	Written tests
11	3		**Mid Exame**		
12	3	7	**The general concept of function variables, in the condition of havi one qualitative independent variab In the regression equation**	Lecture and exercis	watching
13	3	9	**Some other methods are multiple Variables, principal components analysis**	Lecture and exercis	watching
14	3	10	**Path analysis**	Lecture and exercis	watching

11. Course Evaluation

Written tests
the report
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Al-Rawi, Khashi Mahmoud, 1987, Introducti to Regression Analysis, University of Mosul, Ir
Main references (sources)	1-Draper, N. R. and Smith H. 1981. Appl Regression Analysis, 2nd.ED.
Recommended books and references (scientific journals, reports…)	Richard B. Darlington & Andrew F. Hayes. (2017). "Regression Analysis and Linear Models", The GUILFORD PRESS, New York London.
Electronic References, Websites	https://www.coursera.org/learn/predictive-modeling-model-fitting-regression-analysis

Course Description Form

1. Course Name: Decision Theory

2. Course Code: CMOR24-F3271

3. Semester / Year: 6/3nd

4. Description Preparation Date:10/02/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 3/2

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

Name: dr.Zahraa Abed Al-Aziz Al-nuaimi
Email: zahraaalnuaimi2017@uomosul.edu.iq
Name: Neam Hazim Ahmed
Email: neam.alfahady@uomosul.edu.iq

8. Course Objectives

Course Objectives	**1. Topic Introduction:**Decision Theory **2. Identifying the Areas** in which the subject of decision theory is involved. **3. The student learns to connect** between calculus, statistics, and decision theory. **4. The student learns about the types of decisions.** **5. The student learns about the value table, the utility table, and the standard utility** which he creates based on the available data. **6. The student learns about the criteria used to make a decision.** **7. The student investigates the appropriate decision based on the data.** **8. The student learns to create a decision tree and how to use it in decision-making.**

9. Teaching and Learning Strategies

Strategy	A: Knowledge and understanding
	1A. The student learns how to understand the problem and convert the available information into tables or matrices upon which the appropriate decision is made.

2A. The student learns how to use probability theory and differential and integral calculus to find the expected value criterion.
3A. The student learns how to determine the appropriate decision
4A. The student learns how to use a decision tree.

B- Subject-specific skills

1B- The student learns the concept of decision and its types

2B- The student is able to distinguish and identify different decision cases through real examples (certainty, uncertainty, risk)

3B- The student learns to make a decision based on the data before and after using the utility function, which is determined based on the issue

4B- The student learns about the decision tree, its types and uses in discrimination-

C- Thinking skills

1C- The student learns how to use the criteria

2C- The student applies the criteria to real issues

3C- The student thinks about giving the decision that achieves the highest profit in the case of investment and profit and the least loss in cases that deal with loss

4C. The student learns the decision tree and how to use it to make the best decision

D - General and transferable skills

(other skills related to employability and personal development).

D1- The student implements the different criteria

D2- Draws the decision tree

D3- Writes a computer program to calculate the expected value and variance

D4- Gives the final decision

10. Course Structure

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

1	3	A	Basic concepts in decisio theory	Lecture discussion	Lecture and discussion
2	3	A	States of nature and types decisions, value function, ut function, utility table / stanc utility table	Lecture discussion	Lecture and discussion
3	3	A&B	Regret table or regret funct	Lecture discussion	Lecture and discussion
4	3	A&B	Payback table	Lecture and prob solving	Lecture and problem solvi
5	3	**B&A**	States of decisio maker	Lecture and prob solving	Lecture and problem solvi
6	3	**A & C**	Decision making case of complete certaint	Lecture discussion	Lecture and discussion
7	3	**B & C**	Criteria of decision makir	Lecture discussion	Lecture and discussion
8	3	**A& C**	Optimistic, pessim criterion, Laplac criterion	Lecture discussion	Lecture and discussion
9	3	**B & C**	LOST opportuniti regret criterion, Hc criterion	Lecture and problem solving	Presentation (power point)
10	3	B	Expected value criterion c payoff table,	Lecture discussion	Assignments and Observati (H.W)
11	3	D	Mid-course exar		
12	3	**A&B**	Random decision process highest expected value criterion or lowest expect value principle	Lecture and Project	Project(Report)
13	3	A ,C&D	Using Bayesian the in decision making investment portfoli	**Lecture and prob solving**	Assignments and Observati (H.W)
14	3	**A& C**	Decision tree	Lecture discussion	Assignments and Observati (H.W)
15	3	C&D	General review of a criteria	**Lecture interrogation**	TEST

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

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	القرارات د.قبيس سعيد عبد الفتاح:دار الكتب للطباعة والنشر
Main references (sources)	محاضرات في نظرية اتخاذ القرار اعداد: د.دلفوف سفيان :2022
Recommended books and references (scientific journals, reports…)	

Electronic References, Websites	http://www.Decision Theory . Pdf.

Stage 4 Course 1

Course Description Form

1. Course Name: constrained optimization (1)

2. Course Code: CMOR24-F4111

3. Semester / Year:

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4 Hours / 3 Units

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

Name: Eman tarik hamed
Email: dr.emantarik@uomosul.edu.iq

8. Course Objectives

Providing the student with skills in solving constrained optimizat problems with indirect method	**• Finding optimal strategies** **• How to build a competitive model** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the basic definitions
A2-The student should write some optimization formulas
A3- The student should describe the method
A4- The student should distinguish between optimization methods
A5- The student explains the mathematical formula of the method
A6- The student should summarize the steps to solve the method

B - Subject-specific skills

B1 - The student applies the method to a numerical problem
B2 - The student should reveal the error in the method.
B3 - The student tabulates the results

C- Thinking skills

C1- That the student chooses the best method.
C2-The student should compare the solution methods.
C3- That the student converts the method and steps for solving the problem from one form to another.
C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employabilit and personal development).

D1- That the student can discover errors himself and solve them.
D2- That the student improves the method used in the solution
D3- Enabling the student to analyze the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Definition and principle of Lagrange function with equality	Lecture and discussion	Observation
2	4	A	some theory of global convergence with equality	Lecture and discussion	Observation
3	4	A&B	of Lagrange function with inequality sufficient and necessary	Lecture and interrogation	(H.W)
4	4	A&B	Find the convex and concave of Lagrange function with inequality	Lecture problem solving	Written tests
5	4	B&C	Solve of Lagrange function with equality	Lecture and discussion	Written tests
6	4	B&C	Definition and principle of Lagrange function with inequality	Lecture and discussion	Observation
7	4	B&C	some theory of global	Lecture and discussion	Observation

			convergence with inequality		
8	**4**	B&C	of Lagrange function with inequality sufficient and necessary	Lecture and discussion	Observation
9	**4**	A&B	**Lagrange function with inequality**	Lecture and problem solving	Observation
10	**4**	B&C	Find the convex and concave of Lagrange function with inequality	Lecture and discussion	(H.W)
11	**4**	B	Solve of Lagrange function with inequality	Lecture and project	Observation
12	**4**	D	some theory of global convergence with inequality and equality	Lecture and discussion	(H.W)
13	**4**	A&B	of Lagrange function with inequality and equality sufficient and necessary	Lecture and problem solving	Observation
14	**4**	A&C	Find the convex and concave of Lagrange function with inequality and equality	Lecture and discussion	Observation
15	**4**	A&C	Solve of Lagrange function with	Lecture and interrogation	TEST

				inequality and equality			

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any) Operation Resear (2011) gupta	
Main references (sources) Engineering optimization theory a practice (2009) Rao	Operation Research (201 gupta
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1. Course Name: Queuing theory (1)

2. Course Code: **CMOR23-F4121**

3. Semester 1 / 2024

4. Description Preparation Date:1/4/2024

5. Available Attendance Forms: In presence

6. Number of Credit Hours (4) / Number of Units (3)

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

Name: Asst. Prof. Dr. Ghazwan Hani Mahmood Email: ghazwan.alsoufi@uomosul.edu.iq
Name: Dr. Oday Abdulrahman Jarjies Email: odayjarjies@uomosul.edu.iq

8. Course Objectives

8. **Introduce the queuing theory.**
9. **To recognize the properties of queuing models.**
10. **To understand the efficiency metrics of queuing models.**
11. **To recognize the types of queuing models and Kendall's notation.**
12. **To realize pure birth and death process.**
13. **This course deals with two different models of queuing theory.**
14. **This is the basic subject for all types of queuing models.**
15. **To develop problem solving skills and an understanding of queuing theory through applying formulas to solve some examples.**

- **Finding opti strategies**
- **How to build competitive model**
- **Market competition ru**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the previous laws
A2- The student should write some terms
A3- The student should describe the model
A4- The student should distinguish between the models
A5- The student explains the mathematical formula
A6- The student summarizes the steps to solve the mathematical formula

B - Subject-specific skills

B1 - The student applies the model to a real situation
B2 - The student must reveal the error in the form.
B3 - The student tabulates the results

C- Thinking skills

C1- The student poses a problem based on reality
C2- The student should compare the solution methods
C3- To rearrange the solution method
C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employability and personal development).

D1- That the student implements the method used by the proof
D2- That the student improves the method used in the solution
D3- Verify the method
D4- Enabling the student to solve the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	The properties of queuing models.	Lecture and discussion	Assignments and Observation (H.W)
2	4	A	The efficiency metrics of queuing models.	Lecture and discussion	Assignments and Observation (H.W)
3	4	A&B	Types of queuing models and Kendall's notation.	Lecture and discussion	Assignments and Observation (H.W)
4	4	A&B	Arrival process.	Lecture and problem solving	Written tests
5	4	B&A	Departure process.	Lecture and problem solving	Written tests
6	4	A & C	Differential-Difference equations of (M/M/1) :(GD/∞ / ∞) Model.	Lecture and discussion	Assignments and Observation (H.W)

7	4	B & C	Probability distribution of Pn.	Lecture and discussion	Assignments and Observation (H.W)
8	4	A& C	Expected number of units in queue and system.	Lecture and discussion	Assignments and Observation (H.W)
9	4	B & C	Expected waiting time in queue and system.	Lecture and problem solving	Presentation (power point)
10	4	B	Numerical examples.	Lecture and discussion	Assignments and Observation (H.W)
11	4	D	Differential-Difference equations of (M/M/1) :(GD/N/ ∞) Model.	Lecture and Project	Project(Report)
12	4	A&B	Probability distribution of Pn.		
13	4	A &C	Expected number of units in queue and system.	Lecture and problem solving	Assignments and Observation (H.W)
14	4	A& C	Waiting time distribution in queue and system.	Lecture and discussion	Assignments and Observation (H.W)
15	4	C&D	Numerical examples.	Lecture and interrogation	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources		
Required textbooks (curricular books, if any)		
Main references (sources)	- جزاع، عبد ذياب. (1986). بحوث العمليات. وزارة التعليم العالي، جامعة بغداد. الطبعة الثانية. 2- الشمرتي، حامد سعد نور. والزبيدي، خليل. (2007). مدخل الى بحوث العمليات. المد الاردنية الهاشمية. دار مجدلاوي للنشر والتو	Operation Research (20 gupta
Recommended books and references (scientific journals, reports…)	1- Adan, I., & Resing, J. (2002). Queueing theory. 2- Sztrik, János, (2012). Basic queueing theory. *University of Debrecen, Faculty of Informatics*	
Electronic References, Websites	https://samehar.files.wordpress.com/2 2/03/queueing-theory-1.pdf	www.gameth ry.net

Course Description Form

1. Course Name: Neural Networks (1)

2. Course Code: CMOR23-F4131

3. Semester / Year: The first semester The fourth stage

4. Description Preparation Date: 1/4/2024

5. Available Attendance Forms: Recording the student's attendance in theoretical lectures

6. Number of Credit Hours (Total) / Number of Units (Total): 60 hours of theory (4 hours per week for 15 weeks, 2 theory, 2 discussion)/number of units (3)

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

Name: Hutheyfa Hazem Taha
E-mail: Hutheyfa17@uomosul.edu.i

8. Course Objectives

Course Objectives	Simulating the human brain Neural networks aim to mimic the way the human brain processes information and makes decisions. 2- Improving machine learning and artificial intelligence Neural networks are used as the basis for many deep learning algorithms, helping to develop more efficient artificial intelligence systems. 3- Improving prediction and decision-making Neural networks are used to predict financial markets, identify future trends, and make data-driven decisions.

9. Teaching and Learning Strategies

Strategy	How to give a lecture 1- Using the blackboard to explain differential equations and solve questions. 2- Continuous discussion by asking questions and answers in the hall a motivating the student to self-think and thus to self-learning. 3- Requesting assignments and discussions to be sent via the online class, Google Classroom. 4- Requiring the writing of scientific reports in the specialty, discussing th reports, and pointing out their strengths and weaknesses to achieve desired goal.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Artificial Neural Network	Examples wi exercises	Lecture using the blackboard	Short exams, and Quarterly and final
2	4	Define Artificial Neural network	Examples wi exercises	Lecture using The blackboard	Short exams, and Quarterly and final
3	4	Development stages Artificial Neural Network	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
4	4	Why The Neural Network	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
5	4	General description of how a neuron works	Examples with exercises	The blackboard The blackboard	Short exams, and Quarterly and final
6	4	Data processing method	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
7	4	Difference with neurons	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
8	4	Components of aneure cell	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
9	4	Back propagation network	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
10	4	Methods of learning neural networks	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
11	4	Network Learning algorithm	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
12	4	The process of training or learning the network	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
13	4	Error Back Propagation methodology	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
14	4	Error Back Propagation algorithm	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final

11. Course Evaluation

Distributing the score out of 40 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 ar	
Main references (sources)	Descriptions Neural Network
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Modeling
2. Course Code: **CMOR23-F4141**
3. Semester / Year:
4. Description Preparation Date:2025/1/23
5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 4 / Number of Units (Total) 3

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

Name: asmaa abdulmunem abdullah
Email: asmaa.abd@uomosul.edu.iq

8. Course Objectives

Course Objectives	**• Finding optin strategies** **• How to build competitive model** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- To enable the student to understand the subject of modeling

A2- The goal of the modeling course is to introduce the student to mathematical modeling and how to build the model using differential and differential equations and practical applications on them.

B - Subject-specific skills

B1 - The student applies the model to a real situation

B2 - The student should be able to solve the model mathematically

C- Thinking skills

C1- The student takes a problem from reality

C2- The student should compare the methods of solving differential equations and differential equations for the same problem

C3- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employability and personal development).

D1- The student should implement the method followed by solving the models.

D2- The student improves the method used in the solution

D3- To verify the results of the method

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	**4**	A	**An introductory introduction to models and modeling, types of models - scientific modeling, components of the model - types of models, mathematical modeling - classification of mathematical models, stages of building a mathematical model**	Lecture and discussion	Assignments and Observation (H.W)
2	**4**	A	**Using differential equations in building population models Thomas Malthus model**	Lecture and discussion	Assignments and Observation (H.W)
3	**4**	A&B	**Water heating modeling - Car accident modeling - Carbon decay modeling (using differential equations)**	Lecture and discussion	Assignments and Observation (H.W)
4	**4**	A&B	**Modeling Change with Difference Equations, Sequences and Dynamic Systems An easy model for modeling change - various examples**	Lecture and problem solving	Written tests

	5	**4**	**B&A**	**Difference equations - Solving difference equations - Examples**	Lecture and problem solving	Written tests
	6	**4**	**A & C**	**Case studies in deterministic modeling of change**	Lecture and discussion	Assignments and Observation (H.W)
	7	**4**	**B & C**	**Modeling Newton's law of cooling,**	Lecture and discussion	Assignments and Observation (H.W)
	8	**4**	**A& C**	**Home mortgage modeling**	Lecture and discussion	Assignments and Observation (H.W)
	9	**4**	**B & C**	**Savings Certificate Modeling**	Lecture and problem solving	Presentation (power point)
	10	**4**	B	**Modeling the decay and half-life of radium**	Lecture and discussion	Assignments and Observation (H.W)
	11	**4**	D	**Mid-course exam**	Lecture and Project	Project(Report)
	12	**4**	**A&B**	**Drug modeling in blood**		
	13	**4**	A &C	**Logistics model with applications**	**Lecture and problem solving**	Assignments and Observation (H.W)
	14	**4**	**A& C**	**Application of the logistic model of**	Lecture and discussion	Assignments and

				growth in whale society		Observation (H.W)
	15	**4**	C&D	**Exam**	**Lecture and interrogation**	TEST

11.Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any) **مدخل الى النمذجة الرياضية بأستخدام ال matlb (الجزء الاول)** **مدخل الى النمذجة الرياضية بأستخدام الmatlb (الجزء الثاني)** **تأليف : الاستاذ الدكتور باسل يونس ذنون**	
Main references (sources): **كتاب** (نمذجة ومحاكاة) / جامعة افريقيا العالمية/ اعداد: رامي الطيب مصطفى البشير)	Operation Resear (2011) gupta
Recommended books and references (scientific journals, reports...) **النمذجة والمحاكاة** **تأليف : د. عدنان ماجد عبدالرحيم**	
Electronic References, Websit https://www.arageek.com/l/%d8%a7%d9%84%d9%86%d9%85%d8%b0%d8%ac%d8%a9-%d9%88%d8%a7%d9%84%d9%85%d8%ad%d8%a7%d9%83%d8%7%d8	www.gametheory.t

Course Description Form

1. Course Name: Reliability theory
2. Course Code: CMOR23-F4251
3. Semester / Year:4th

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 3 / Number of Units (Total) 2

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

Name: Lec. Ahmed N. Alkhateeb
Email: ahmed.alkhateeb@uomosul.edu.iq

8. Course Objectives

Course Objectives	**• Finding optimal strategies** **• How to build a competitive model** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the previous laws
A2- The student should write some terms
A3- The student should describe the model
A4- The student should distinguish between the models
A5- The student explains the mathematical formula
A6- The student summarizes the steps to solve the mathematical formula

B - Subject-specific skills

B1 - The student applies the model to a real situation
B2 - The student must reveal the error in the form.
B3 - The student tabulates the results

C- Thinking skills

C1- The student poses a problem based on reality
C2- The student should compare the solution methods
C3- To rearrange the solution method
C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employability and personal development).

D1- That the student implements the method used by the proof
D2- That the student improves the method used in the solution
D3- Verify the method
D4- Enabling the student to solve the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	3	A	Concept of Reliability	Lecture and discussion	Assignments and Observation (H.W)
2	3	A	Elements of reliability	Lecture and discussion	Assignments and Observation (H.W)
3	3	A&B	Continuous distribution	Lecture and discussion	Assignments and Observation (H.W)
4	3	A&B	Reliability function	Lecture and problem solving	Written tests
5	3	B&A	Mean time to failure	Lecture and problem solving	Written tests
6	3	A & C	Hazard funciotn	Lecture and discussion	Assignments and Observation (H.W)
7	3	B & C	Cumulative function and failure rate	Lecture and discussion	Assignments and Observation (H.W)

8	3	A& C	Reliability condition	Lecture and discussion	Assignments and Observation (H.W)
9	3	B & C	Constant failure rate	Lecture and problem solving	Presentation (power point)
10	3	B	Failure model	Lecture and discussion	Assignments and Observation (H.W)
11	3	D	Half exam	Lecture and Project	Project(Report)
12	3	A&B	Exponentail Distribution		
13	3	A &C	Weibull Distribution	Lecture and problem solving	Assignments and Observation (H.W)
14	3	A& C	Types of systems	Lecture and discussion	Assignments and Observation (H.W)
15	3	C&D	Systems diagram	Lecture and interrogation	TEST

11. Course Evaluation

Written tests
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources): An introduction to reliability and maintainabi engineering by	Operation Research (20 gupta

Recommended books and references (scientific journals, reports…): Introduction to Reliability Analysis Probability Models and Statistical Method	
Electronic References, Websites	www.gametheory.net

Stage 4 Course 2

Course Description Form

1. Course Name :constrained optimization (2)
2. Course Code: CMOR24-F4211

3. Semester / Year:

4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) / Number of Units (Total) 4 Hours / 3 Units

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

Name: Eman tarik hamed
Email: dr.emantarik@uomosul.edu.iq

8. Course Objectives

Providing the student with skills in solving constrained optimizat problems with direct method	**• Finding optimal strategies** **• How to build a competitive model** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- The student should mention the basic definitions
A2-The student should write some optimization formulas
A3- The student should describe the method
A4- The student should distinguish between optimization methods
A5- The student explains the mathematical formula of the method
A6- The student should summarize the steps to solve the method

B - Subject-specific skills

B1 - The student applies the method to a numerical problem
B2 - The student should reveal the error in the method.
B3 - The student tabulates the results

C- Thinking skills

C1- That the student chooses the best method.
C2-The student should compare the solution methods.
C3- That the student converts the method and steps for solving the problem from one form to another.
C4- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employabilit and personal development).

D1- That the student can discover errors himself and solve them.
D2- That the student improves the method used in the solution

D3- Enabling the student to analyze the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Definition and principle of sum method with equality	Lecture and discussion	Observation
2	4	A	Definition and principle of sum method with	Lecture and discussion	Observation
3	4	A&B	inequality	Lecture and interrogation	(H.W)
4	4	A&B	Solve sum method with inequality	Lecture problem solving	Written tests
5	4	B&C	Solve sum method with equality	Lecture and discussion	Written tests
6	4	B&C	G.p.p method	Lecture and discussion	Observation
7	4	B&C	S.p.p method	Lecture and discussion	Observation
8	4	B&C	Q.p.p method	Lecture and discussion	Observation
9	4	A&B	S.Q.p method	Lecture and problem solving	Observation
10	4	B&C	S.L.p method	Lecture and discussion	(H.W)
11	4	B	Cutting plan method	Lecture and project	Observation
12	4	D	Solve sum method (equality) with MATLAB	Lecture and discussion	(H.W)
13	4	A&B	Solve sum method (inequality) with MATLAB	Lecture and problem solving	Observation
14	4	A&C	Solve sum method (inequality and equality) with MATLAB	Lecture and discussion	Observation

	15	**4**	A&C	Solve cutting plan with MATLAB	Lecture and interrogation	TEST	

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any) Operation Resea (2011) gupta	
Main references (sources) Engineering optimization theory a practice (2009) Rao	Operation Research (20 gupta
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	www.gametheory.net

Course Description Form

1. Course Name: Queuing theory (2)

2. Course Code: **CMOR23-F4221**

3. Semester 2 / 2024

4. Description Preparation Date:1/4/2024

5. Available Attendance Forms: In presence

6. Number of Credit Hours (4) / Number of Units (3)

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

Name: Asst. Prof. Dr. Ghazwan Hani Mahmood Email: ghazwan.alsoufi@uomosul.edu.iq
Name: Dr. Oday Abdulrahman Jarjies Email: odayjarjies@uomosul.edu.iq

8. Course Objectives

16. **To develop problem solving skills and an understanding of queuing theory through applying formulas to solve some examples.**
17. **To recognize different kind of queuing models.**
18. **To understand the efficiency metrics for different types of queuing models.**
19. **To analysis some the queuing models.**
20. **To perform some the queuing models.**
21. **This is the advance subject for all types of queuing models.**

- **Finding opti strategies**
- **How to build competitive model**
- **Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding
A1- The student should mention the previous laws
A2- The student should write some terms
A3- The student should describe the model
A4- The student should distinguish between the models
A5- The student explains the mathematical formula
A6- The student summarizes the steps to solve the mathematical formula
B - Subject-specific skills
B1 - The student applies the model to a real situation
B2 - The student must reveal the error in the form.
B3 - The student tabulates the results

C- Thinking skills
C1- The student poses a problem based on reality
C2- The student should compare the solution methods
C3- To rearrange the solution method
C4- To plan how to use the appropriate method in the solution
D - General and transferable skills (other skills related to employability and personal development).
D1- That the student implements the method used by the proof
D2- That the student improves the method used in the solution
D3- Verify the method
D4- Enabling the student to solve the results

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Differential-Difference equations of (M/M/C) :(GD/∞/∞) Model.	Lecture and discussion	Assignments and Observation (H.W)
2	4	A	Probability distribution of Pn.	Lecture and discussion	Assignments and Observation (H.W)
3	4	A&B	Expected number of units in queue and system.	Lecture and discussion	Assignments and Observation (H.W)
4	4	A&B	Waiting time distribution in queue and system.	Lecture and problem solving	Written tests
5	4	B&A	Numerical examples.	Lecture and problem solving	Written tests
6	4	A & C	Differential-Difference equations of (M/M/C) :(GD/N/∞) Model.	Lecture and discussion	Assignments and Observation (H.W)
7	4	B & C	Probability distribution of Pn and expected number of units in queue and system.	Lecture and discussion	Assignments and Observation (H.W)
8	4	A& C	Waiting time distribution in queue and system.	Lecture and discussion	Assignments and Observation (H.W)

9	4	B & C	Numerical examples.	Lecture and problem solving	Presentation (power point)
10	4	B	Probability distribution of Pn for (M/M/1) :(GD/ ∞/N) Model	Lecture and discussion	Assignments and Observation (H.W)
11	4	D	Expected number of units and waiting time in queue and system.	Lecture and Project	Project(Report)
12	4	A&B	Numerical examples.		
13	4	A &C	Probability distribution of Pn for (M/M/C):(GD/N/N) Model and expected number of units for model.	Lecture and problem solving	Assignments and Observation (H.W)
14	4	A& C	Waiting time in queue and system and numerical examples.	Lecture and discussion	Assignments and Observation (H.W)
15	4	C&D	Probability distribution of Pn for (M/M/∞) :(GD/ ∞/∞) Model and Numerical example.	Lecture and interrogation	TEST

11. Course Evaluation

Written tests
Project(Report)
Presentation (power point)
Assignments and Observation (H.W)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)		

Main references (sources)	- جزاع، عبد ذياب. (1986). بحوث العمليات. وزارة التعليم العالي، جامعة بغداد. الطبعة الثانية. 2- الشمرتي، حامد سعد نور. والزبيدي، خليل. (2007). مدخل الى بحوث العمل المملكة الاردنية الهاشمية. دار مجدلاوي لل والتوز	Operation Research (2011) gupta
Recommended books and references (scientific journals, reports…)	1- Adan, I., & Resing, J. (2002). Queueing theory. 2- Sztrik, János, (2012). Basic queueing theory. *University of Debrecen, Faculty of Informatics*	
Electronic References, Websites	https://samehar.files.wordpress.com 22/03/queueing-theory-1.pdf	www.gametl ory.net

Course Description Form

1. Course Name: Neural Networks (2)
2. Course Code: CMOR23-F4231
3. Semester / Year: The second semester of The fourth stage

4. Description Preparation Date: 1/2/2025

5. Available Attendance Forms: Recording the student's attendance in theoretical lectures

6. Number of Credit Hours (Total) / Number of Units (Total): 60 hours of theory (4 hours per week for 15 weeks, 2 theory, 2 discussion)/number of units (3)

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

Name: Hutheyfa Hazem Taha
E-mail : Hutheyfa17@uomosul.edu.i

8. Course Objectives

Course Objectives	Hussein Efficiency of Interactive Systems 1- Neural networks are used in voice and image recognition systems, such as voice assistants (Siri, Google Assistant) and facial recognition systems. Human behavior analysis and future predictions. 2- Neural networks are used in analyzing user data to extract patterns and predict consumer behavior in marketing and e-commerce. 3- Unstructured data analysis Neural networks help in understanding and analyzing te audio and video data, enabling search engine optimiza and machine translation.

9. Teaching and Learning Strategies

Strategy	How to give a lecture 1- Using the blackboard to explain differential equations and solve questions. 2- Continuous discussion by asking questions and answers in the hall a motivating the student to self-think and thus to self-learning. 3- Requesting assignments and discussions to be sent via the online class, Google Classroom. 4- Requiring the writing of scientific reports in the specialty, discussing th reports, and pointing out their strengths and weaknesses to achieve desired goal.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Statistical Neural Networks	Examples wit exercises	Lecture using the blackbo Neural Netwo ard	Short exams, and Quarterly and final
2	4	RBF Neural Networks	Examples wit exercises	Lecture using The blackboard	Short exams, and Quarterly and final
3	4	PNN Neural Networks	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
4	4	Method of PNN	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
5	4	GRNN Neural Networks	Examples with exercises	The blackboard The blackboard	Short exams, and Quarterly and final
6	4	Method of Logy GRNN	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
7	4	Comparison Between GRNN and RBF	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
8	4	شبكةperceptron	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
9	4	شبكة backpropagation	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
10	4	شبكةMcCulloch Pitts	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
11	4	شبكةWiddro Hoff	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
12	4	شبكةCompetitive	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
13	4	شبكةHebbian	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final
14	4	مناقشة النتائج	Examples with exercises	Lecture using The blackboard	Short exams, and Quarterly and final

11. Course Evaluation

Distributing the score out of 40 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 an	
Main references (sources)	Descriptions Neural Network

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: simulation
2. Course Code: **CMOR23-F4241**
3. Semester / Year:
4. Description Preparation Date:23/1/2025
5. Available Attendance Forms: In presence

6. Number of Credit Hours (Total) 4 / Number of Units (Total) 3

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

Name: asmaa abdulmunem abdullah
Email: asmaa.abd@uomosul.edu.iq

8. Course Objectives

Course Objectives:--to enable the student to understand the subject simulation and its applications **Public life matters** **- How to build a simulation model and generate random numbers**	**• Finding optimal strategies** **• How to build a competitive mode** **• Market competition rules**

9. Teaching and Learning Strategies

A- Knowledge and understanding

A1- How to generate random numbers in different ways

A2- Facilitating the development of models for any problem,
its solution, and creating simulations for it.and practical applications on them

A3-- To learn how to apply and use programming in modeling and simulation

B - Subject-specific skills

B1 - The student applies the simulation model to a real situation

B2 - The student should be able to perform manual simulation

C- Thinking skills

C1- The student takes a problem from reality

C2- The student will compare between manual and computer simulation methods

C3- To plan how to use the appropriate method in the solution

D - General and transferable skills (other skills related to employability and personal development).

D1- That the student implements the methods used in solving the simulation

D2- The student should improve the method used in the solution

D3- To verify the results of the method

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	4	A	Knowing simulation, simulation using computer – –	Lecture and discussion	Assignments and Observation (H.W)
2	4	A	objectives of simulation, – advantages of simulation	Lecture and discussion	Assignments and Observation (H.W)
3	4	A&B	disadvantages of simulation models,	Lecture and discussion	Assignments and Observation (H.W)
4	4	A&B	The Monte Carlo method	Lecture and problem solving	Written tests
5	4	B&A	methods for generating random numbers	Lecture and problem solving	Written tests
6	4	A & C	the mean method of multiplication	Lecture and discussion	Assignments and Observation (H.W)
7	4	B & C	the mean square method	Lecture and discussion	Assignments and Observation (H.W)

	8	**4**	**A& C**	**, the inverse method**	Lecture and discussion	Assignments and Observation (H.W)
	9	**4**	**B & C**	**Decision simulation, manual simulation – applied examples**	Lecture and problem solving	Presentation (power point)
	10	**4**	B	**Simulation method**	Lecture and discussion	Assignments and Observation (H.W)
	11	**4**	D	**Exam**	Lecture and Project	Project(Report)
	12	**4**	**A&B**	**Simulation method for inventory control, Monte Carlo integration simulation**		
	13	**4**	A &C	**One–dimensional Monte Carlo integration, acceptance and rejection method**	**Lecture and problem solving**	Assignments and Observation (H.W)
	14	**4**	**A& C**	**Multidimensional Monte Carlo integration**	Lecture and discussion	Assignments and Observation (H.W)
	15	**4**	C&D	**Exam**	**Lecture and interrogation**	TEST

11. Course Evaluation	
Written tests Project(Report) Presentation (power point) Assignments and Observation (H.W)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any): **مدخل الى ا مدخل الى النمذج** **الرياضية بأستخدام ال matlb (الجزء الاول)** **مدخل الى النمذجة الرياضيأ** **بأستخدام الmatlb (الجزء الثاني)** **تأليف : الاستاذ الدكتور باسل يون** **ذنون**	
Main references (sources): **كتاب** **نمذجة ومحاكاة) / جامعة افريقيا العالمية/ اعداد: رامي الطيب مصطفى البشير)**	Operation Resear (2011) gupta
Recommended books and references (scientific journals, reports…) النمذجة والمحاكاة تأليف : د. عدنان ماجد عبدالرحيم	
Electronic References, Websit https://www.arageek.com/l/%d8%a7%d9%84%d9%86%d9%85% d8%b0%d8%ac%d8%a9- %d9%88%d8%a7%d9%84%d9%85%d8%ad%d8%a7%d9%83%d8%a7%d	www.gametheory.net

Course Description Form

1. Course Name: English Language
2. Course Code: CMOR23-F4261
3. Semester / Year:2nd
4. Description Preparation Date:2024/2025

5. Available Attendance Forms: In presence

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

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

Name: Zainab Qusay AL-Oraibi
Email: Zainab.q@uomosul.edu.iq

8. Course Objectives

Course Objectives	
1- To think in English and then speak. 2- To be able to talk in English. 3- To be able to compose freely and independently speech and writing. 4- To be able to read books with understanding.	• **Finding optimal strategies** • **How to build a competitive model** • **Market competition rules**

9. Teaching and Learning Strategies

- Speaking skill
A1- He must have the ability to think and speak in English
A2- The ability to speak English fluently
A3- The ability to formulate sentences correctly
B - Reading skill
B1 - The ability to read sentences correctly
B2 - Correct pronunciation of words.
C- Writing skill
C1- The ability to write sentences in English correctly
The ability to express ideas through writing
D - Listening skills.
D1- Developing the student's listening skill
D2-The ability to distinguish words while listening

10. Course Structure

Week	Hours	Required learning outcome	Unit or subject name	Learning method	Evaluation method
1	3	D	Introduction: about the study materials.	Lecture and discussion	Assignments and Observation

2	**3**	A	Grammar: Verbs and nouns. Passive and active voices, and practices.	Lecture and discussion	Assignments and Observation
3	**3**	A&B	Second conditional, practices, questions, and short answers.	Lecture and discussion	Assignments and Observation
4	**3**	A&B	Grammar: might, If I were you.	Lecture and problem-solving	Observation
5	**3**	**B&C**	Vocabulary: phrasal verbs.	Lecture and problem-solving	Observation
6	**3**	**A& B& D**	social expressions, practices.	Lecture and discussion	Observation
7	**3**		Mid-term Exam		
8	**3**	**B& D**	Grammar: Present perfect continuous, practices.	Lecture and discussion	Assignments and Observation
9	**3**	**A& B& D**	Grammar: Words formation, adverbs, reading.	Lecture and problem-solving	Observation
10	**3**	**A& B& D**	Social expressions: Everyday English (telephoning), practices.	Lecture and discussion	Assignments and Observation

	11	**3**	**A& B& D**	Tenses: Past perfect practices, grammar, and pronunciation.	Lecture and discussion	Observation
	12	**3**	**A&B**	Report statement, practices.	Lecture and discussion	Observation
	13	**3**	A &C	Hot verbs (bring, take, come, go).	**Lecture and problem–solving**	Assignments and Observation
	14	**3**	**A& C**	Social expressions about (saying goodbye), practices.	Lecture and discussion	Assignments and Observation
	15	**3**	C&D	Study the material review	Lecture	Observation

11. Course Evaluation

Written tests
Participate
Assignments and Observation

12. Learning and Teaching Resources

Required textbooks (Headway pre-intermediate plus student's book (John and Soars))	
Main references (Headway pre-intermediate plus work's book)	Operation Research (20 gupta
Recommended books and references (scientific journals, reports…)	
Websites https://7esl.com/	www.gametheory.net