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

Academic Program and Course Description Guide

2024-2025

Academic Program Description Form

University Name: University of Mosul

Faculty /Institute: Collage of Computer Science and Mathematics

Scientific Department: Department of Statistics and Informatics

Academic or Professional Program Name: Bachelor of Science in Statistics

Final Certificate Name: Bachelor Science in Statistics

Academic System: Bologna Process (First and Second Year), Semester System (Third and Fourth Year)

Description Preparation date: 3/ 12 /2024

File Completion Date: 8 /12 /2024

Signature:

Head of Department Name: Statistics and Informatics

Asst. Prof Dr. Muzahem Mohammed Al-Hashimi

Date: 5/ 1 /2025

Signature

Scientific Associate Name:

Prof Dr. Safwan Omar Hasoon

Date: 5 / 1 /2025

The file has been checked by: Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Date: 5 / 1 /2025

Signature:

Dr. Ibrahim Mohammed Ahmed

Approval of the Dean

Prof. Dr. Dhuha Basheer Abdullah

5 / 1 / 2025

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

1. Program Vision

The goal of the department is to maintain the distinguished scientific reputation derived from the quality of its alumni in terms of knowledge, skills, and abilities to perform robust statistical analyses and decision making.

2. Program Mission

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

3. Program Objectives

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

4. Program Accreditation

Does the program have program accreditation? And from which agency?
Accreditation Board for Engineering and Technology (ABET)

5. Other external influences

Central examinations

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	9	2	20.4%	
College Requirements	11	3	16.6%	
Department Requirements	34	3	63%	
Summer Training	40	2	100%	
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours theoretical	Credit Hours practical
First year/ Chapter I	STAT101	Elementary Statistics I	3	-
	STAT102	Calculus I	3	-
	STAT103	Basics Programming	2	1
	STAT104	Linear Algebra	2	-
	UOM104	Democracy & Human Rights	2	-
	UOM101	Arabic Language	2	-
First year/ Chapter II	STAT107	Elementary Statistics II	3	1
	STAT108	Calculus II	3	1
	STAT109	Demography	2	-
	STAT110	MATLAB programming	2	-
	UOM103	Computer	2	-
	UOM102	English Language	2	-
Second Year/ Chapter I	STAT201	Probability and random variables(1)	3	1
	STAT202	Sampling Theory(1)	3	1
	STAT203	Numerical Analysis(1)	2	2
	STAT204	Calculus III	2	1
	STAT205	Data structures(1)	2	-
	UOM2050	Crimes of the Baath Regime in Iraq	2	-
	UOM2012	Arabic2	2	-
Second Year/ Chapter II	STAT206	Probability and random variables(2)	3	1
	STAT207	Sampling Theory(2)	3	-
	STAT208	Numerical Analysis(2)	2	2
	STAT209	Time Series Analysis	2	-
	STAT2010	Research Methodology	2	2
	UOM2032	Computr2	2	-
	UOM2022	English Language	2	-
Third Year/ Chapter I	CMSI25-F3111	Mathematical Statistics(1)	3	-
	CMSI25-F3151	Operation Research(1)	3	-
	CMSI25-F3121	Regression Analysis(1)	3	-
	CMSI25-F3161	Information Systems Management	3	-
	CMSI25-F3171	queuing theory	2	-
	CMSI25-F3131	Biostatistics(1)	2	-
	CMSI25-F3141	Reliability	3	-
Third Year/ Chapter II	CMSI25-F3211	Mathematical Statistics(2)	3	-
	CMSI25-F3251	Operation Research(2)	3	-
	CMSI25-F3261	Information security	2	2
	CMSI25-F3241	Data Mining(1)	2	2
	CMSI25-F3231	Biostatistics(2)	2	-
	CMSI25-F3221	Regression Analysis(2)	3	-
		English Language	2	-
the fourth year/ Chapter I	CMSI25-F4121	Stochastic Processes(1)	3	-
	CMSI25-F4141	Design and Analysis of Experiments (1)	3	-
	CMSI25-F4151	Data Mining(2)	2	2
	CMSI25-F4161	Simulation	2	-
	CMSI25-F4111	Statistical Inference(1)	3	-
	CMSI25-F4131	Multivariate Analysis(1)	3	-
the fourth year/ Chapter II	CMSI25-F4221	Stochastic Processes(2)	3	-
	CMSI25-F4251	Intelligence Techniques	2	2

	CMSI25-F4231	Multivariate Analysis(2)	3	-
	CMSI25-F4241	Design and Analysis of Experiments (2)	3	-
	CMSI25-F4211	Statistical Inference(2)	3	-
		English Language	2	-
		Project	4	-

8. Expected learning outcomes of the program

Knowledge

1. The student learns modern statistical methods and the importance of statistics in various scientific, medical and economic fields, including humanity. 2. Teach the student the importance of statistics combined with mathematics and computer science. 3. Learns the ability to find possible scientific solutions to solve any problem. 4. The student learned the ability to program based on various modern applied statistical programs and various programming languages by writing special programs to solve the problem. 5. The student learns to expand his imagination and establish probabilistic laws in solving and estimating problems. 6. The ability to develop sound ideas, build mathematical models for them, and estimate their features according to various statistical methods. 7. The ability to set appropriate hypotheses to solve any problem while testing them according to the appropriate statistical methods for the purpose of making the correct statement. 8. Developing the student's skills to link statistics and intelligence systems, which are based on analysis, deduction, and decision-making. 9. Providing the student with some basic rules for evaluating, building, programming, and analyzing statistical information systems on modern foundations. 10. Providing the student with sufficient information in analysis, design, and research.	1. Theory 2. Process 3. Student training/summer training 4. Graduation research

Skills

1. The skill of deduction and analysis. 2. Mathematical and statistical solution skill. 3. The skill of comparing, building hypotheses, and making decisions. 4. The skill of building, analyzing and interpreting mathematical models. 5. The skill of discussing and making the right decisions. 6. Skill in using modern means, including computers. 7. Skill in using modern applied statistical programs and programming languages. 8. The skill of writing programs to solve and estimate problems. 9. The skill of searching for correct scientific information. 10. The skill of conducting scientific research, analyzing it, solving its problems, and drawing appropriate conclusions in solving them for the purpose of decision-making.	1. The ability to study group. 2. The ability to conduct scientific discussion among students. 3. The ability to develop skills among students. 4. Ability in discussion, analysis, and collective decision-making. Develop the ability to cooperate.

Ethics	
1. Demonstrate awareness of ethical issues related to data privacy, confidentiality, and intellectual property. 2. Adhere to ethical guidelines and professional standards in statistical analysis and informatics practices. 3. Embrace lifelong learning and stay updated with emerging trends and technologies in the field.	

9. Teaching and Learning Strategies

1. Continuous aspiration towards cognitive excellence in education, scientific research and professional service in various sciences.
2. Preparing students for the labor market and developing their abilities to interact and communicate with others through effective participation in the field training program.
3. Acquiring skills to present ideas and work within one team through graduation projects.
4. Qualifying students for postgraduate studies in the field of statistics, informatics, and operations research.
5. Preparing specialized scientific leaders through the graduate program.
6. Interaction with other sciences, especially mathematics and computers.

10. Evaluation methods

1. Electronic exams (on line).
2. Central and monthly examinations.
3. Daily exams.
4. Daily duties.
5. Scientific reports
6. Computerized laboratory examinations.
7. Graduation projects.

11.Faculty						
Faculty Members						
Academic Rank	**Specialization**		**Special Requirements/Skills (if applicable)**		**Number of the teaching staff**	
	General	**Special**			**Staff**	**Lecturer**
professor	Science in statistics	Applied Statistics			1	
Assistant Professor	Science in statistics	Mathematical Statistics			6	
Assistant Professor	Science in statistics	Stochastic Processes			1	
Assistant Professor	Science in statistics	time series			2	
Assistant Professor	Science in statistics	Applied Statistics			3	
Teacher	Science in statistics	Mathematical Statistics			1	
Teacher	Science in statistics	Multivariate			1	
Teacher	Science in statistics	Biostatistics			1	
Teacher	Science in statistics	Spatial Statistics			1	
Teacher	Science in statistics	Applied Statistics			14	
Teacher	Computer	Artificial Intelligence			1	
Teacher	Computer	security			1	
Assistant teacher	Science in statistics	Applied Statistics			8	
Assistant teacher	Computer	Computer vision			1	
Assistant teacher	Law	Criminal law			1	

Professional Development
Mentoring new faculty members
1. E-learning.   2. Using the Internet.   3. Using modern means of communication.   4. Use modern means of communication.   5. Extracurricular activities.   6. Advanced training courses in learning modern programs.   7. Scientific statistical consultations and ways of developing and applying them in various fields.
Professional development of faculty members
Briefly describe the academic and professional development plan and arrangements for faculty members such as teaching and learning strategies, assessment of learning outcomes, professional development, etc.

12. Acceptance Criterion

1. Central admission to the Ministry of Higher Education and Scientific Research.

2. The student's average is on the central admission lists, with the exception of the children of teaching staff, the martyrs' building, and the privileges stipulated in the Ministry's instructions, as they are accepted according to desire for distribution among the scientific departments.

13. The most important sources of information about the program

State briefly the sources of information about the program.

14. Program Development Plan

Transferring academic subjects for all levels in the Department of Statistics and Informatics to the Bologna track
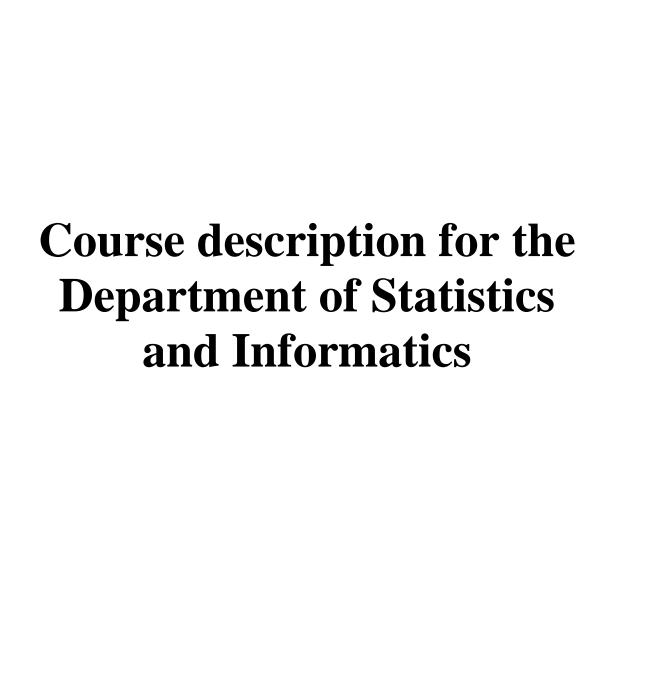
Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year/ Chapter I	STAT101	Elementary Statistics I	C	V	V	V	V	V	V	V	V	V	V	V	
	STAT102	Calculus I	B	V	V	V	V		V	V	V		V	V	
	STAT103	Basics Programming	B		V	V	V	V	V	V	V	V	V	V	V
	STAT104	Linear Algebra	B	V	V	V	V	V	V	V	V	V	V	V	V
	UOM104	Democracy & Human Rights	B		V			V					V	V	V
	UOM101	Arabic Language	B		V	V		V	V	V	V		V	V	V
First year/ Chapter II	STAT107	Elementary Statistics II	C	V				V		V			V		
	STAT108	Calculus II	B		V				V	V			V		
	STAT109	Demography	C	V	V	V		V	V	V	V	V	V	V	V
	STAT110	MATLAB programming	B	V	V	V		V	V	V	V	V	V	V	V
	UOM103	Computer	B	V					V	V	V	V	V	V	V
	UOM102	English Language	B	V	V	V		V	V	V	V		V	V	V

Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year/ Chapter I	STAT201	Probability and random variables(1)	**C**	V				V	V	V	V	V		V	V
	STAT202	Sampling Theory(1)	**C**	V	V	V	V	V	V	V	V	V	V	V	V
	STAT203	Numerical Analysis(1)	**B**		V	V	V		V	V	V		V	V	V
	STAT204	Calculus III	**B**	V	V	V	V		V	V	V		V	V	V
	STAT205	Data structures(1)	**B**	V	V	V	V		V			V		V	V
	UOM2050	Crimes of the Baath Regime in Iraq	**B**						V				V		
	UOM2012	Arabic2	**B**		V	V		V		V	V	V			
Second Year/ Chapter II	STAT206	Probability and random variables(2)	**C**	V	V	V		V		V	V	V	V	V	V
	STAT207	Sampling Theory(2)	**C**	V	V	V		V	V	V	V	V	V	V	V
	STAT208	Numerical Analysis(2)	**B**		V				V			V			
	STAT209	Time Series Analysis	**B**	V				V					V		
	STAT2010	Research Methodology	**S**	V		V	V	V	V	V		V		V	V
	UOM2032	Computr2	**B**	V		V	V	V	V	V		V		V	V
	UOM2022	English Language	**B**	V		V	V	V	V					V	V

Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Third Year/ Chapter I	CMSI25-F3111	Mathematical Statistics(1)	**Basic**	V	V	V	V	V	V	V	V	V	V	V	V
	CMSI25-F3151	Operation Research(1)	**Basic**	V	V	V	V	V	V	V	V	V	V	V	V
	CMSI25-F3121	Regression Analysis(1)	**Basic**	V	V	V	V	V				V	V	V	V
	CMSI25-F3161	Information Systems Management	**Basic**		V				V	V	V		V		
	CMSI25-F3171	queuing theory	**my choice**	V	V	V	V		V	V	V		V		
	CMSI25-F3131	Biostatistics(1)	**my choice**	V	V	V	V	V				V			
	CMSI25-F3141	Reliability	**my choice**	V	V	V	V	V	V	V		V	V	V	
Third Year/ Chapter II	CMSI25-F3211	Mathematical Statistics(2)	**Basic**	V	V	V	V	V	V	V		V	V	V	
	CMSI25-F3251	Operation Research(2)	**Basic**	V					V	V	V	V			
	CMSI25-F3261	Information security	**Basic**		V				V				V		
	CMSI25-F3241	Data Mining(1)	**Basic**	V				V				V			
	CMSI25-F3231	Biostatistics(2)	**my choice**	V				V					V		
	CMSI25-F3221	Regression Analysis(2)	**my choice**		V	V	V	V	V	V	V	V	V		
		English Language	**my choice**		V				V	V	V	V	V		

Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
the fourth year/ Chapter I	CMSI25-F4121	Stochastic Processes(1)	**Basic**	V	V	V	V	V	V	V	V	V		V	V
	CMSI25-F4141	Design and Analysis of Experiments (1)	**Basic**	V	V	V	V	V	V	V	V	V		V	V
	CMSI25-F4151	Data Mining(2)	**Basic**	V	V	V	V	V	V	V	V	V		V	V
	CMSI25-F4161	Simulation	**Basic**	V	V	V	V		V				V	V	V
	CMSI25-F4111	Statistical Inference(1)	**Basic**	V				V				V			
	CMSI25-F4131	Multivariate Analysis(1)	**Basic**	V				V	V	V	V	V	V	V	V
the fourth year/ Chapter II	CMSI25-F4221	Stochastic Processes(2)	**Basic**	V				V	V	V	V	V	V	V	V
	CMSI25-F4251	Intelligence Techniques	**Basic**		V				V			V	V	V	V
	CMSI25-F4231	Multivariate Analysis(2)	**Basic**	V		V	V	V				V	V	V	V
	CMSI25-F4241	Design and Analysis of Experiments (2)	**Basic**	V		V	V	V	V	V	V	V	V	V	V
	CMSI25-F4211	Statistical Inference(2)	**Basic**	V		V	V	V	V	V	V	V			
		English Language	**Basic**	V		V	V		V				V		
		Project	**Basic**	V		V	V		V				V		

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

Course description for the Department of Statistics and Informatics

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Raya

Academic title: prof.assistant

Academic qualification: Ph.D.

Email: rayasalim73@uomosul.edu.iq

Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025
Course Description Form

1. Course Name:
D/ Statistical inference(1)/First phase

2. Course Code:
CMSI25-F2251

3. Available Attendance Forms:
Classrooms of department statistics and informatics

4. Number of Credit Hours (Total) / Number of Units (Total)
theoretical hours and (1) discussion hours/number of units: 3 (3)

5. Course Objectives	
Course Objectives	• 1 .Identify properties of a good estimators • 2.Learn about point Estimation methods

6. Teaching and Learning Strategies	
Strategy	1. Gaining the ability to know the properties of the estimator in terms of Unbiasedness ,consistency, efficiency, etc 2. Developing the skull to compere statistical estimators using statistical criteria 3. Acquire the ability to find point estimator for probability distribution parameter

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3(T),1(D)	Recognizing the concepts of parameter, random variable, sample space, and parameter space	Introduction to statistics inferential	Black board	
Week 2	3(T),1(D)	Study of the non-bias property with examples of estimators of parameters of some discrete and continuous distributions	Unbiased property	Black board	
Week 3	3(T),1(D)	Studying the mean square error and using it to compare estimators with examples	. Mean square error	Blackborad	

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Lecturer's name: Dr. Raya

Academic title: prof.assistant

Academic qualification: Ph.D.

Email: rayasalim73@uomosul.edu.iq

Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025

Week 4	3(T),1(D)	Study of the consistency property with examples of estimators of the parameters of some continuous and discrete distributions	Consistency properly	Blackboard	Daily and monthly exams
Week 5	3(T),1(D)	Study of the adequacy property by the conditional probability method with examples of estimators of the parameters of some continuous and discrete . distributions	Sufficincy property conditional probability method	Blackboard	Daily and monthly exams
Week 6	3(T),1(D)	Studying the adequacy property by factoring method and how to find the sufficient estimator with examples of estimators of the parameters of some . probability distributions	The adequacy property is a factorisation method	Blackboard	Daily and monthly exams
Week 7	3(T),1(D)	Studying the property of adequacy by likening the probability distribution to the exponential family and finding a sufficient estimator with examples of estimators of the parameters of some .probability distributions	Sufficiency property Exponetail family method	Blackboard	Daily and monthly exams
Week 8	3(T),1(D)	Studying the efficiency property by likening the probability distribution to the exponential family and finding an adequate estimator with examples of estimators of the parameters of some probability distributions ~~~~	Semester exam	Blackboard	Daily and monthly exams
Week 9	3(T),1(D)	Study of the efficiency property, Fisher information, and how to know the efficiency of the estimator, as well as the comparison between two estimators	Efficiency property	Blackboard	Daily and monthly exams

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Lecturer's name: Dr. Raya

Academic title: prof.assistant

Academic qualification: Ph.D.

Email: rayasalim73@uomosul.edu.iq

Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025

Week 10	3(T),1(D)	. Study of Cramer-Rao's inequality and its use in studying the property of the unbiased estimator with minimal variance	Cramer -Raw inqality	Blackboard	Daily and monthly exams
Week 11	3(T),1(D)	Study of point estimation methods and their properties ~~	Some point Estimation method	Blackboard	Daily and monthly exams
Week 12	3(T),1(D)	Study of estimation ~~ by the method of moments with examples	Estimation using the method of moment	Blackboard and PowerPoint	Daily and monthly exams
Week 13	3(T),1(D)	Study of estimation by the maximum likelihood method with examples	Maximum likelihood Estimation	Blackboard	Daily and monthly exams
		.			

8. Course Evaluation
Endeavor score: 40. Exam score. Course: 60. Final score: 100

9. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Methods for solving differential equations / written by Khaled Al-Samarrai
Main references (sources)	Engineering Mathematics / Written by Khaled Abdel Hamid Al-Nouri
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

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Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025
Course Description Form

1. Course Name: D/ Statistical inference(2)/First phase	
2. Course Code:	
CMSI25-F2251	
3. Available Attendance Forms:	
Classrooms in the Department of Statistics and Informatics	
4. Number of Credit Hours (Total) / Number of Units (Total)	
3theoretical hours and 1 discussion hours/number of units: 3	
5. Course Objectives	
Course Objectives	• Objectives of the study material 1. Identify how to construct confidence intervals for mean and variance parameters~~ 2. Learn about testing statistical hypotheses from a theoretical and applied aspect~~ 3. Learn how to calculate errors of the first and second types
6. Teaching and Learning Strategies	
Strategy	1 – Acquiring the ability to know how to find confidence intervals for the mean and variance 2 – Developing the skill to test statistical hypotheses, determining the critical region, and calculating errors of the first and second types 3 – Acquiring the ability to find the best critical region

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3(T),1(D)	Learn about point and interval estimation methods	Introduction about estimation Theory	Blackboard	Daily and monthly exams
Week 2	3(T),1(D)	Explain how to construct confidence intervals	Interval estimation	Blackboard	Daily and monthly exams
Week 3	3(T),1(D)	Illustrate how to construct a confidence interval about mean	Interval estimation about mean	Blackboard	Daily and monthly exams
Week 4	3(T),1(D)	Explain how to form a confidence interval for the difference between two	Interval estimation for difference between two means	Blackboard	Daily and monthly exams

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Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025

		means from two natural populations in the case of known and unknown variance and the sample size is small and large with the drawing			
Week 5	3(T),1(D)	Explain how to construct the confidence interval for the variance in the case of a known and unknown population mean with a drawing	Interval Estimation for variances	Blackboard	Daily and monthly exams
Week 6	3(T),1(D)	Illustrate how to construct a confidence interval for a ratio between two variances with a diagram	Interval estimation for ratio between two variances	Blackboard	Daily and monthly exams
Week 7	3(T),1(D)	.	Example	Blackboard	Daily and monthly exams
Week 8	3(T),1(D)	Derivation of the power function law and its relationship with errors of the first and second ~~~~types	Power function	Blackboard	Daily and monthly exams
Week 9	3(T),1(D)		Examples	Blackboard	Daily and monthly exams
Week 10	3(T),1(D)	Derivation of a law for this function and its relationship with the power and error function of the first and second kindDerivation of a law for this function and its relationship with the power and error function of the first and second kind	Operating characteristic function	Blackboard	Daily and monthly exams
Week 11	3(T),1(D)		Examples	Blackboard	Daily and monthly exams

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Stage : FOURTH
Subject: Statistical Inference

For the academic year 2024-2025

Week 12	3(T),1(D)	Finding the best critical region based on the ratio between two weighting functions	Best critical region	Blackboard	Daily and monthly exams
Week 13	3(t),1(d)	Choosing the statistical hypothesis sequentially based on observations instead of taking the entire sample	Sequential test	Blackboard	Daily and monthly exams

8. Course Evaluation	
Endeavor score: 40. Exam score. Course: 60. Final score: 100	

9. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Methods for solving differential equations / written by Khaled Al-Samarrai
Main references (sources)	Engineering Mathematics / Written by Khaled Abdel Hamid Al-Nouri
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name:Dr.omar salim ibrahim

Academic title:teacher

Academic qualification:Ph.D.

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Stage : Fourth
Subject: Simulation

For the academic year 2024-2025
Course Description Form

1. Course Name:
Simulation

2. Course Code:
CMSI23-F4161

3. Semester / Year:
First semester / year 2022-2023

4. Available Attendance Forms:
Attendance in the classroom

5. Number of Credit Hours (Total) / Number of Units (Total)
Number of study hours (3) / Number of units (3)

6. Course Objectives	
Course Objectives	• It aims to present concepts about simulation • Intermittent event simulation • Generating random numbers according to certain probability functions • The student will be able to generate data from continuous and discrete distributions using MATLAB programming to practice simulation • Students' ability to understand statistical models in simulation and program them

7. Teaching and Learning Strategies	
Strategy	Study of simulation, starting with the introduction, basic definitions, and how to perform manual simulation of some problems The student will be able to understand and know the simulation Devise appropriate methods to solve statistical problems Able to generate random numbers manually Able to generate random numbers using statistical software The student devises appropriate methods to solve the problems he faces in data analysis Adds his knowledge of statistical programming to solve problems He communicates effectively with his colleagues while working on the computer completing assignments

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Academic title:teacher

Academic qualification:Ph.D.

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Stage : Fourth

Subject: Simulation

For the academic year 2024-2025

8.	Course Structure				
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	The student will be able to understand and learn about the simulation	Introduction to modeling and simulation	Classroom + blackboard + data show	Exam
2	3	The student will be able to understand and learn about the simulation	Characteristics of simulation models/simulation model/simulation objectives/disadvantages and advantages of simulation	Classroom + blackboard + data show	Exam
3	3	The student will be able to understand and learn about the simulation	Areas of simulation application / steps in simulation studying / simulation programs / simulation methods	Classroom +blackboard + data show	Exam
4	3	Able to generate random numbers manually	Generating Random namber /methods of generating random numbers with examples of each method and programming in the Matlab language	Classroom +blackboard + data show	Homework
5	3	Able to generate random numbers manually	Linear congenital method / inverse method / inverse transformation method in the case of discrete random variables	Classroom + blackboard + data show + calculator lab	Homework
6	3	He communicates effectively with his colleagues while working on the computer and completing assignments	The inverse transformation method in the case of continuous random variables with example	Classroom + blackboard + data show + calculator lab	discussion
7	3	Able to generate random numbers manually and using statistical software	Distributions and Simulation Random Variable Generation for Continuous Distributions	Classroom + blackboard + data show + calculator lab	Exam
8	3	Able to generate random numbers manually and using statistical software	;Distributions and Simulation Random Variable Generation for Continuous Distributions	Classroom + blackboard + data show + calculator lab	discussion
9	3	Able to generate random numbers manually	Generating random numbers using two functions	Classroom + blackboard + data show + calculator lab	Homework
10	3	Able to solve problems	Midterm Exam	Classroom	Exam
11	3	Able to generate random numbers manually and using	Random Variable Generation for Discrete Distributions	Classroom + blackboard + data show + calculator lab	discussion

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Stage : Fourth
Subject: Simulation

For the academic year 2024-2025

			statistical software		
12	3	Able to generate random numbers manually and using statistical software	Random Variable Generation for Discrete Distributions	Classroom + blackboard + data show + calculator lab	discussion
13	3	He uses his knowledge of statistical programming to solve problems He communicates effectively with his colleagues while working on the computer and completing assignments	Methods for generating continuous and discrete distributions using ready-made functions in MATLAB + learning generation using the ready-made program Minitab	Classroom + blackboard + data show + calculator lab	Reports
14	3	The student devises appropriate methods to solve the problems he faces in data analysis	Methods for testing random numbers	Classroom + blackboard + data show + calculator lab	Exam
15	3	The student devises appropriate methods to solve the problems he faces in data analysis	Examples of generating random numbers with three different probability functions, continuous Simulation Methods / and discrete box moller	Classroom + blackboard + data show + calculator lab	Exam

9. Course Evaluation

20 marks monthly exam ,5 marks daily exam,5 grade exam reports ,5 marks exam assignments ,5 marks for oral exam , 60 marks for the final exam of the course, 100 Final grade

10.Learning and Teaching Resources

Required textbooks (curricular books, if any)	An introduction to computer stochastic simulation and its modeling using MATLAB, Dr. Basil Younis
Main references (sources)	Discrete-Event System Simulation", Banks Carson II Nelson Nicol, Fifth Edition"
Recommended books and references (scientific journals, reports...)	nothing
Electronic References, Websites	nothing

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Lecturer
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Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025
Course Description Form

1. Course Name:
Design and Analysis of Experiments (1) / second stage

2. Course Code:
CMSI25-F4141

3. Semester / Year:
The first academic course

4. Available Attendance Forms:
Classrooms in the Department of Statistics and Informatics

5. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical hours and 2 Practical hours/number of units: 3

6. Course Objectives	
Course Objectives	• Gain practical experience in designing and conducting experiments while developing critical thinking skills to assess the appropriateness of experimental designs for specific research questions. • Acquire the ability to select the appropriate experiment design based on scientific principles. • Empower students to handle data when encountering statistical challenges that necessitate analysis. • Equip students with the knowledge and skills necessary for performing statistical analysis, constructing analysis of variance tables, conducting comparisons, and testing hypotheses and confidence intervals. • Improve problem-solving skills within the context of experiment design, result evaluation, and interpretation.

7. Teaching and Learning Strategies	
Strategy	• Introducing fundamental concepts and statistical methods for the design and analysis of experiments. • Cultivating students' ability to critically assess experimental designs, interpret data, and draw meaningful conclusions. • Employing diverse educational strategies to enhance knowledge acquisition. • Fostering active student participation through engaging class discussions and problem-solving exercises. • Assessing students to gauge their knowledge, skills, and comprehension.

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Lecturer
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Email: wisam-stat@uomosul.edu.iq

Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025

8. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	2 theoretical + 2 Practical	Understand fundamental concepts and terminology.	Fundamental concepts and terminology.	Blackboard and PowerPoint	Daily and monthly exams
Week 2	2 theoretical + 2 Practical	Familiarize with the fundamentals of experimental design	Fundamentals of experimental design.	Blackboard and PowerPoint	Daily and monthly exams
Week 3	2 theoretical + 2 Practical	Gain knowledge of Completely Randomized Design	Completely Randomized Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 4	2 theoretical + 2 Practical	Understand the application of Completely Randomized Design in the case of unequal replications.	Completely Randomized Design in the case of unequal replications.	Blackboard and PowerPoint	Daily and monthly exams
Week 5	2 theoretical + 2 Practical	Learn to implement Complete Randomized Design with more than one observation per Experimental Unit.	Complete Randomized Design with more than one observation per Experimental Unit.	Blackboard and PowerPoint	Daily and monthly exams
Week 6	2 theoretical + 2 Practical	Develop familiarity with Randomized Complete Block Design	familiarity with Randomized Complete Block Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 7	2 theoretical + 2 Practical	Acquire skills for handling missing values	Missing values.	Blackboard and PowerPoint	Daily and monthly exams
Week 8	2 theoretical + 2 Practical	Gain proficiency in Randomized Complete Block Design with more than one observation per Experimental Unit.	Randomized Complete Block Design with more than one observation per Experimental Unit.	Blackboard and PowerPoint	Daily and monthly exams
Week 9	2 theoretical + 2 Practical	Learn how to determine the number of blocks or replications.	Determine the number of blocks or replications.	Blackboard and PowerPoint	Daily and monthly exams
Week 10	2 theoretical + 2 Practical	**Mid Examination**		Blackboard and	Daily and monthly exams

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Department of Statistics and Informatics

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Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025

				PowerPoint	
Week 11	2 theoretical + 2 Practical	Familiarize with the Latin Square Design.	Latin Square Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 12	2 theoretical + 2 Practical	Gain familiarity with the Latin Square Design with more than one observation per Experimental Unit.	Latin Square Design with more than one observation per Experimental Unit.	Blackboard and PowerPoint	Daily and monthly exams
Week 13	2 theoretical + 2 Practical	Acquire familiarity with the Graeco-Latin Square Design.	Graeco-Latin Square Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 14	2 theoretical + 2 Practical	Develop familiarity with multiple comparisons.	Multiple comparisons.	Blackboard and PowerPoint	Daily and monthly exams
Week 15	2 theoretical + 2 Practical	**1st Semester Final Exam**		Blackboard and PowerPoint	Daily and monthly exams

9. Course Evaluation
Endeavor score: 40. Exam score. Course: 60. Final score: 100

10.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Alrrawi, Khasheh and Mahmoud Khalaf Allah. Design and analysis of agricultural experiments. Dar Al Kutub Printing and Publishing Foundation. University of Al-Mosul. Iraq.
Main references (sources)	Al-Imam, Mohammed. Design and analysis of experiments. Al-Riyadh, Saudi Arabia, 2010.
Recommended books and references (scientific journals, reports...)	Montgomery, Douglas C. Design and analysis of experiments. John wiley & sons, 2017.
Electronic References, Websites	World Wide Web

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025
Course Description Form

1. Course Name:
Design and Analysis of Experiments (2) / second stage
2. Course Code:
CMSI25-F4241
3. Semester / Year:
The second academic course
4. Available Attendance Forms:
Classrooms in the Department of Statistics and Informatics
5. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical hours and 2 Practical hours/number of units: 3

6. Course Objectives	
Course Objectives	• Gain practical experience in designing and conducting experiments while developing critical thinking skills to assess the appropriateness of experimental designs for specific research questions. • Acquire the ability to select the appropriate experiment design based on scientific principles. • Empower students to handle data when encountering statistical challenges that necessitate analysis. • Equip students with the knowledge and skills necessary for performing statistical analysis, constructing analysis of variance tables, conducting comparisons, and testing hypotheses and confidence intervals. • Improve problem-solving skills within the context of experiment design, result evaluation, and interpretation.

7. Teaching and Learning Strategies	
Strategy	• Introducing fundamental concepts and statistical methods for the design and analysis of experiments. • Cultivating students' ability to critically assess experimental designs, interpret data, and draw meaningful conclusions. • Employing diverse educational strategies to enhance knowledge acquisition. • Fostering active student participation through engaging class discussions and problem-solving exercises.

Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025

8. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	2 theoretical + 2 Practical	Familiarize with the Randomized Incomplete Block Design.	Randomized Incomplete Block Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 2	2 theoretical + 2 Practical	Familiarize with Youden Square Design.	Youden Square Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 3	2 theoretical + 2 Practical	Factorial Experiments.	Factorial Experiments.	Blackboard and PowerPoint	Daily and monthly exams
Week 4	2 theoretical + 2 Practical	Familiarize with Two-Factor Experiment in a C.R.D.	Two-Factor Experiment in a C.R.D.	Blackboard and PowerPoint	Daily and monthly exams
Week 5	2 theoretical + 2 Practical	Familiarize with Three-Factor Experiment in a C.R.D.	Three-Factor Experiment in a C.R.D	Blackboard and PowerPoint	Daily and monthly exams
Week 6	2 theoretical + 2 Practical	Familiarize with Factorial Experiment Conducted in a R.C.B.D.	Factorial Experiment Conducted in a R.C.B.D.	Blackboard and PowerPoint	Daily and monthly exams
Week 7	2 theoretical + 2 Practical	Familiarize with Factorial Experiment in a L.S.Design.	Factorial Experiment in a L.S.Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 8	2 theoretical + 2 Practical	Mid Examination		Blackboard and PowerPoint	Daily and monthly exams
Week 9	2 theoretical + 2 Practical	Familiarize with Nested and Nested-Factorial Experiments.	Nested and Nested-Factorial Experiments.	Blackboard and PowerPoint	Daily and monthly exams
Week 10	2 theoretical + 2 Practical	Familiarize with Confounding.	Confounding	Blackboard and PowerPoint	Daily and monthly exams
Week 11	2 theoretical + 2 Practical	Familiarize with Complete Confounding.	Complete Confounding	Blackboard and PowerPoint	Daily and monthly exams
Week 12	2 theoretical + 2 Practical	Familiarize with Partial Confounding	Partial Confounding	Blackboard and PowerPoint	Daily and monthly exams

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Email: wisam-stat@uomosul.edu.iq

Stage : Fourth
Subject: Design and Analysis of Experiments

For the academic year 2024-2025

Week 13	2 theoretical + 2 Practical	Familiarize with Split-plot Designs.	Split-plot Designs.	Blackboard and PowerPoint	Daily and monthly exams
Week 14	2 theoretical + 2 Practical	Familiarize with Split-Split Plot Design.	Split-Split Plot Design.	Blackboard and PowerPoint	Daily and monthly exams
Week 15	2 theoretical + 2 Practical	**2st Semester Final Exam**		Blackboard and PowerPoint	Daily and monthly exams

9. Course Evaluation
Endeavor score: 40. Exam score. Course: 60. Final score: 100

10.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Alrrawi, Khasheh and Mahmoud Khalaf Allah. Design and analysis of agricult experiments. Dar Al Kutub Printing and Publishing Foundation. University of Al-Mo Iraq.
Main references (sources)	Al-Imam, Mohammed. Design and analysis of experiments. Al-Riyadh, Saudi Ara 2010.
Recommended books and references (scientific journals, reports...)	Montgomery, Douglas C. Design and analysis of experiments. John wiley & sons, 2017.
Electronic References, Websites	World Wide Web

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name:dr.omar salim ibrahim
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Stage : Fourth
Subject: Simulation

For the academic year 2024-2025
Course Description Form

1. Course Name:
Intelligent techniques

2. Course Code:
CMSI23-F4251

3. Available Attendance Forms:
Attendance in the classroom

4. Number of Credit Hours (Total) / Number of Units (Total)
Number of study hours (4) / Number of units (3)

5. Course Objectives	
Course Objectives	• **Understand the basics of artificial intelligence and its sub-fields.** • **Enable the student to solve some statistical problems using artificial intelligence algorithms represented by artificial neural networks** • **Explore real-world applications of AI across various industries. Understand the basics of artificial intelligence and its sub-fields.** • **The student should be able to describe the models and algorithms used in artificial neural networks** • **Studying the most important modern intelligent technologies** **Writing special programs in neural networks** • **Study neural networks, the most important algorithms and genetic algorithm**

6. Teaching and Learning Strategies	
Strategy	If the student successfully completes this course, he will be able to: 1- Knowing the importance of artificial intelligence applications 2- Writing special programs in neural networks and algorithms 3- Learn about open-loop, closed-loop, single-layer and multi-layer artificial neural networks 4- Explains the most important applications of artificial neural networks and genetic algorithms. 5- Explains the benefits and drawbacks of applications of artificial neural networks and genetic algorithms 6- Enabling the student to solve some statistical problems using artificial intelligence algorithms 7 – Enabling the student to write programs for artificial intelligence

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Email: omarsalim85@uomosul.edu.iq

Stage : Fourth
Subject: Simulation

For the academic year 2024-2025

7. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	The student will be able to understand and know artificial intelligence	Introduction to artificial intelligence / Artificial intelligence applications / Fields of artificial intelligence	Classroom + blackboard + data show	Exam
2	3	The student will be able to understand and know artificial neural networks	Introduction to artificial neural networks / Its properties, applications, and relationship to the biological network	Classroom + blackboard + data show	Exam
3	3	The student will be able to understand and know transformation functions	Components of neural networks, activation or transformation functions with application examples + programming in the Matlab language	Classroom +blackboard + data show	Exam
4	3	Neural network architecture	Single Layer Networks / recurrent neural networks / Multi-layer networks / with examples	Classroom +blackboard + data show	Homework
5	3	Neural networks	- Methods of teaching intelligent neural network / - Supervised education / - Unsupervised education / - Reinforcing education	Classroom + blackboard + data show + calculator lab	Homework
6	3	The student will be able to understand and draw types of neural networks	Examples of how to draw different types of neural networks / ,Logic gates	Classroom + blackboard + data show + calculator lab	discussion

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Stage : Fourth

Subject: Simulation

For the academic year 2024-2025

			Application on MATLAB		
7	3	The student will be able to understand neural network algorithms	Mc Culloch-Pitts Neuron	Classroom + blackboard + data show + calculator lab	Exam
8	3	The student will be able to understand neural network algorithms	Examples of a network Mc Culloch-Pitts Neuron Application to MATLAB	Classroom + blackboard + data show + calculator lab	discussion
9	3	The student will be able to understand neural network algorithms	Perceptron network algorithm	Classroom + blackboard + data show + calculator lab	Homework
10	3	The student will be able to understand neural network algorithms	Examples of perceptron network algorithm	Classroom	Exam
11	3	The student will be able to understand neural network algorithms	Exam	Classroom + blackboard + data show + calculator lab	discussion
12	3	The student will be able to understand neural networks	Error back propagation algorithm	Classroom + blackboard + data show + calculator lab	discussion
13	3	The student will be able to understand neural network algorithms	Examples of error back propagation network	Classroom + blackboard + data show + calculator lab	Reports
14	3	The student will be able to understand genetic algorithm	Definition of genetic algorithm Steps of genetic algorithm Genetic algorithm terminology Creation of chromosomes	Classroom + blackboard + data show + calculator lab	Exam

Ministry of Higher Education and Scientific Research
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University of Mosul
Department of Statistics and Informatics

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Stage : Fourth

Subject: Simulation

For the academic year 2024-2025

15	3	The student will be able to understand genetic algorithm	- Boom Mathematical examples of genetic algorithm	Classroom + blackboard + data show + calculator lab	General questions and discussion + achievement test

8. Course Evaluation

20 marks monthly exam ;5 marks daily exam ;5 grade exam reports

5 marks exam assignments ;5 marks for oral exam ;10 marks laboratory practical exam ; 50 marks for the final exam of the course

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Nothing
Main references (sources)	Jeannette Lawrence, "Inrtoduction to neural networks", 5th edition, 1993. Jacek Zurada , "Introduction to Artificial Neural Systems", 1st edition, 1994. S.N. Sivanadam and S.N. Deepa, "Introduction to Genetic Algorithm", 1st edition, 2007.
Recommended books and references (scientific journals, reports...)	Dr. S. N. Sivanandam and Dr. M. Paulraj, "Introduction to Artificial Neural Networks", Vikas Publishing House PVT LTD, 2003. Fakhreddine O. Karray and Clarence De Silva, "Soft computing and Intellegent System Design", 2004.
Electronic References, Websites	Nothing

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Stage :4ᵗʰ
Subject: Data mining (2)

For the academic year 2024-2025
Course Description Form

1. Course Name:	
Data mining (2)	
2. Course Code:	
CMSI25-F4151	
3. Available Attendance Forms:	
Attendance+Examination	
4. Number of Credit Hours (Total) / Number of Units (Total)	
2 + 2 Practice	
5. Course Objectives	
It is considered a complement to Data Mining (1) and aims to specialize more in data mining concepts and methods.	
6. Teaching and Learning Strategies	
Developing students on data mining, classification, and clustering by using statistical and machine learning methods	

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		**Extracting Rules from Groups**	**Blackboard and PowerPoint**	Assignment
Week 2	2		**Decision Trees**	**Blackboard and PowerPoint**	
Week 3	2		**Splitting criteria**	**Blackboard and PowerPoint**	
Week 4	2		**Examples of solution**	**Blackboard and PowerPoint**	
Week 5	2		**Classification**	**Blackboard and**	

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Stage :4th
Subject: Data mining (2)

For the academic year 2024-2025

					PowerPoint	
Week 6	2		**Linear simple regression**		**Blackboard and PowerPoint**	
Week 7	2		**Examples of solution**		**Blackboard and PowerPoint**	Assignment
Week 8			1st Mid-course Exam			
Week 9	2		**Multiple linear regression**		**Blackboard and PowerPoint**	
Week 10	2		**Classification and regression trees**		**Blackboard and PowerPoint**	Assignment
Week 11	2		**Logistic Regression**		**Blackboard and PowerPoint**	
Week 12	2		**Neural Networks**		**Blackboard and PowerPoint**	
Week 13			2nd Mid-course Exam			
Week 14	2		**Time series data mining**			
Week 15	2		**Case study**			

8. Course Evaluation

40 for mid-course exam, 60 for final exam

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	**Giudici, P. (2005).** *Applied data mining: statistical methods for business and industry.* **John Wiley & Sons.** **Nisbet, R., Elder, J., & Miner, G. (2009).** *Handbook of statistical analysis and data mining applications.* **Academic press.**
Electronic References, Websites	

Stage : Forth
Subject: Stochastics Processes

For the academic year 2024-2025
Course Description Form

1. Course Name:
Stochastic Processes I

2. Course Code:
CMSI25-F4121

3. Available Attendance Forms:
Studying in classrooms in the department

4. Number of Credit Hours (Total) / Number of Units (Total)
Theory 3 + Tutorial 1 in week / 3 units

5. Course Objectives	
Course Objectives	1. This course provides a comprehensive introduction to stochastic processes.
	2. Focusing on their fundamental concepts, principles, and applications.
	3. It covers topics ranging from basic probability theory to advanced stochastic models.
	4. Equipping students with the necessary knowledge and skills to analyze and model various phenomena involving randomness and uncertainty.
	5. Modeling and analyzing systems with the Markov property.
	6. Understanding the behavior of Markov chains.
	7. Examining transition probabilities and constructing transition matrices.
	8. Studying special types of Markov chains, such as absorbing and ergodic chains.
	9. Determining and analyzing the stationary distribution.

6. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, computer labs, assignments, quizzes, and projects.

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
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Stage : Forth
Subject: Stochastics Processes

For the academic year 2024-2025

7. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Understanding of generating function and probability generating	Definition of generating function and probability generating function.	Lecture, discussion.	Exams, assignments, and reports.
2	4	Understanding of generating function and probability generating	Probability generating function of sum discrete random variables.	Lecture, discussion.	Exams, assignments, and reports.
3	4	Understanding of generating function and probability generating	Probability generating function of sum of a random number of discrete random variables.	Lecture, discussion.	Exams, assignments, and reports.
4	4	Understanding of generating function and probability generating	Generating function of bivariate distribution.	Lecture, discussion.	Exams, assignments, and reports.
5	4	Gain a solid understanding of the fundamental concepts and principles of stochastic processes	Introduction to Stochastic processes.	Lecture, discussion.	Exams, assignments, and reports.
6	4	Gain a solid understanding of the fundamental concepts and principles of stochastic processes	Definitions and examples of stochastic processes.	Lecture, discussion.	Exams, assignments, and reports.
7	4	Identify and analyze sources of uncertainty and randomness in various systems	Specification of stochastic processes with independent increments.	Lecture, discussion.	Exams, assignments, and reports.
8	4	Identify and analyze sources of uncertainty and randomness in various systems	Mid-term Exam + Stationary processes, Covariance stationary, Gaussian process.	Lecture, discussion.	Exams, assignments, and reports.
9	4	Develop skills in predicting and forecasting future outcomes using stochastic models	Definition of Markov Chain and transition probability matrix.	Lecture, discussion.	Exams, assignments, and reports.
10	4	Develop skills in predicting and	Random walk and Absorbing barriers.	Lecture, discussion.	Exams, assignments,

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Muthanna Subhi Sulaiman
Academic title: Asst. Prof.
Academic qualification: Ph.D.
Email:
muthanna.sulaiman@uomosul.edu.iq

Stage : Forth

Subject: Stochastics Processes

For the academic year 2024-2025

		forecasting future outcomes using stochastic models			and reports.
11	4	Apply stochastic processes to model and solve problems	Higher transition probabilities (derivation of Chapman-Kolmogorov equation).	Lecture, discussion.	Exams, assignments, and reports.
12	4	Apply stochastic processes to model and solve problems	Initial distribution and Probability Distribution.	Lecture, discussion.	Exams, assignments, and reports.
13	4	Gain proficiency in using computational tools and programming languages to simulate and analyze stochastic processes	Transition Diagram and Transition tree with application and examples of M.C.	Lecture, discussion.	Exams, assignments, and reports.
14	4	Gain proficiency in using computational tools and programming languages to simulate and analyze stochastic processes	Two-state Markov chain.	Lecture, discussion.	Exams, assignments, and reports.
15	4	Gain proficiency in using computational tools and programming languages to simulate and analyze stochastic processes	Introduction to classification of Markov chain.	Lecture, discussion.	Exams, assignments, and reports.

8. 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 , 40+60

9. Learning and Teaching Resources

Required textbooks (curricul books, if any)	Al-Rubaie, Fadel Mohsen and Abd, Salah Hamza, (2000), "Introduction to Stochastic Processes." Dar-Books and Documents, Baghdad.
Main references (sources)	• Cox D.R &H.D. Miller, "The theory of stochastic process", 1985. • Parzen," Stochastic Process", 1962. • Ross, S. M. (1983), ''Stochastic Processes'' Wiley, New York.
Recommended books and references (scientific journals, reports...)	Thanoun, Basil Younis, (2011), "Markovian Modeling with Practical Applications." Dar Ibn Al-Atheer for Printing and Publishing, University of Mosul, Iraq. Part one and two.
Electronic References, Websites	

Stage : Forth
Subject: Stochastics Processes

For the academic year 2024-2025
Course Description Form

1. Course Name:
Stochastic Processes II

2. Course Code:
CMSI25-F4221

3. Available Attendance Forms:
Studying in classrooms in the department

4. Number of Credit Hours (Total) / Number of Units (Total)
Theory 3 + Tutorial 1 in week / 3 units

5. Course Objectives	
Course Objectives	1. Understand the concept of a Markov chain and its classifications.
	2. Recognize the different types of states in a Markov chain, such as absorbing, transient, and recurrent states.
	3. Learn to classify Markov chains based on their behavior, including irreducible, reducible, and periodic chains.
	4. Identify and analyze the stationary distribution of a Markov chain.
	5. Understand the basic properties and characteristics of a Poisson process.
	6. Derive and interpret the probability density function and cumulative distribution function of the Poisson process.
	7. Understand the concept and assumptions of a branching process.
	8. Calculate the mean and variance of a branching process.
	9. Understand the characteristics and assumptions of a birth and death process.
	10. Calculate the mean and variance of a birth and death process.
	11. Understand the basic concepts and components of queuing models.
	12. Identify and apply different queuing models, such as M/M/1.

6. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, computer labs, assignments, quizzes, and projects.

7. Course Structure

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Muthanna Subhi Sulaiman
Academic title: Asst. Prof.
Academic qualification: Ph.D.
Email: muthanna.sulaiman@uomosul.edu.iq

Stage : Forth

Subject: Stochastics Processes

For the academic year 2024-2025

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Communicate effectively, both orally and in writing, about the concepts, analysis, and results related to the classification of these stochastic processes.	Classification of Markov Chain. Classification of state of a Markov chain.	Lecture, discussion.	Exams, assignments, and reports.
2	4	Classify and analyze different types of states or behaviors within each process, such as absorbing, transient, recurrent, and periodic states.	Recurrent and transient states.	Lecture, discussion.	Exams, assignments, and reports.
3	4	Classify and analyze different types of states or behaviors within each process, such as absorbing, transient, recurrent, and periodic states.	Computation of first passage and mean recurrence time.	Lecture, discussion.	Exams, assignments, and reports.
4	4	Evaluate and interpret the stationary distribution, steady-state behavior, and equilibrium properties of the processes.	Stationary distribution of a Markov chain (steady states dist.).	Lecture, discussion.	Exams, assignments, and reports.
5	4	Gain a solid understanding of the fundamental concepts and principles of stochastic processes	Markov Process with discrete state space, introduction to counting process.	Lecture, discussion.	Exams, assignments, and reports.
6	4	Gain a solid understanding of the fundamental concepts and principles of stochastic processes	The Poisson process, and assumptions Poisson process.	Lecture, discussion.	Exams, assignments, and reports.
7	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Derivation the p.d.f. of a Poisson process.	Lecture, discussion.	Exams, assignments, and reports.
8	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction	Properties of Poisson process, additive and difference property.	Lecture, discussion.	Exams, assignments, and reports.

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Academic qualification: Ph.D.
Email: muthanna.sulaiman@uomosul.edu.iq

Stage : Forth
Subject: Stochastics Processes

For the academic year 2024-2025

			probabilities, and waiting times.			
9	4	Develop forecasting skills and forecast future results using stochastic models.	Mid-term Exam + Decomposition of a Poisson process.	Lecture, discussion.	Exams, assignments, and reports.
10	4	Develop forecasting skills and forecast future results using stochastic models.	Poisson process and related distribution-Inter arrival time and waiting time.	Lecture, discussion.	Exams, assignments, and reports.
11	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Introduction to Branching Process. Generating function and probability of extinction.	Lecture, discussion.	Exams, assignments, and reports.
12	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Calculate the mean and variance of a branching process.	Lecture, discussion.	Exams, assignments, and reports.
13	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Birth and Death process. Pure Birth process and Yule – Furry process.	Lecture, discussion.	Exams, assignments, and reports.
14	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Pure death process and pure Birth – Death process.	Lecture, discussion.	Exams, assignments, and reports.
15	4	Calculate and interpret relevant performance measures, such as mean, variance, extinction probabilities, and waiting times.	Stochastic Process in Queuing model, General concepts, m/m/1 steady state behavior.	Lecture, discussion.	Exams, assignments, and reports.

**Ministry of Higher Education and
Scientific Research
College of Computer Science and
Mathematics
University of Mosul
Department of Statistics and
Informatics**

**Lecturer's name: Dr. Muthanna
Subhi Sulaiman
Academic title: Asst. Prof.
Academic qualification: Ph.D.
Email:
muthanna.sulaiman@uomosul.edu.iq**

Stage : Forth

Subject: Stochastics Processes

For the academic year 2024-2025

8. 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 , 40+60

9. Learning and Teaching Resources	
Required textbo (curricular books, if any)	Al-Rubaie, Fadel Mohsen and Abd, Salah Hamza, (2000), "Introduction to Stochastic Processes." Dar-Books and Documents, Baghdad.
Main references (sources	• Cox D.R &H.D. Miller, "The theory of stochastic process", 1985. • Parzen," Stochastic Process", 1962. • Ross, S. M. (1983), ''Stochastic Processes'' Wiley, New York.
Recommended books and references (scientific journals, reports...)	Thanoun, Basil Younis, (2011), "Markovian Modeling with Practical Applications." Dar Ibn Al-Atheer for Printing and Publishing, University of Mosul, Iraq. Part one and two.
Electronic Referenc Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Hayfa Abdul Jawad Saieed

Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025
Course Description Form

1. Course Name:	
Mathematical Statistics I	
2. Course Code:	
CMSI25-F3111	
3. Semester / Year:	
First semester	
4. Description Preparation Date:	
February 10th 2025	
5. Available Attendance Forms:	
In-class	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Lecture hours: 3 hours, Recitation: 1 hour, Credit: 3 Credit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Hayfa Abdul Jawad Saieed Email: hayfaajwad.65@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	1. Explain probability mass, density, cumulative distribution functions, joint density, mass, and cumulative functions with their properties 2. Identify different moments of a single variable and their properties and relations between moments 3. Identifying generating functions and cumulants with their uses and

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Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

	properties
	4. Learn about important measures such as median, modes, harmonic mean, variance, mean deviation, and coefficient of variation. These measures are essential in studying statistical properties of discrete and continuous distributions Which the student will study in Mathematical Statistics 2 in the second course.
	5. Learning joint probability functions, marginal and conditional probability functions, joint, marginal, conditional moments, joint generating functions, and cumulants.
	6. Defining theoretical joint measures such as covariance, sim[ple] correlation, and partial correlation coefficients.

9. Teaching and Learning Strategies

Strategy	
	Encouraging students to participate in the class through discussion a[nd] solving exercises, while improving and expanding their critical thinki[ng] skills through reports and using software to calculate cumulat[ive] probabilities, moments, or drawing probability functions. Also linking [the] knowledge, they receive with the subjects that they studied in previo[us] levels and the levels that they will turn to later.

10. Course Structure

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Hayfa Abdul Jawad Saieed

Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week	4	Probability mass and densit functions, Cumulativ distribution function wit properties	Lecture_01	Lecture	Homework
Week	4	Mathematical expectatio with properties, Moment around zero, central an non-central moment factorial moments	Lecture_02	Lecture	Homework
Week	4	Moment generatin function, characteristi function with properties	Lecture_03	Lecture	Homework
Week	4	Probability generatin function, cumulan generating function	Lecture_04	Lecture	Homework
Week	4	Median, Modes, Harmoni mean, geometric mean	Lecture_05	Lecture	Homework
Week	4	Mean deviation, varianc with properties	Lecture_06	Lecture	Homework
Week	4	Midterm exam	---	---	Test

Ministry of Higher Education and Scientific Research
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Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

Week	4	Joint probability mass and density functions, joint cumulative distribution functions	Lecture_07	Lecture	Homework
Week 9	4	Marginal density, mass cumulative functions	Lecture_08	Lecture	Homework
Week 10	4	Joint moments, marginal moments, independence	Lecture_09	Lecture	Homework
Week 11	4	Joint moment generating characteristic function, joint cumulant generating functions and marginals	Lecture_10	Lecture	Homework
Week 12	4	Conditional distributions conditional cumulative distribution function with properties	Lecture_11	Lecture	Homework
Week 13	4	Conditional moments	Lecture_12	Lecture	Homework
Week 14	4	Covariance and simple correlation coefficients	Lecture_13	Lecture	Homework
Week 15	4	Partial correlation with examples	Lecture_14	Lecture	Homework
Week	4	Final exam	---	---	Test

Ministry of Higher Education and Scientific Research
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Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

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11.Course Evaluation
Quizzes: 2 (worth 10%)
Assignments: 2 (worth 10%)
Open-book exams: 5 (worth 10%)
Reports: 1 (worth 10%)
Midterm Exam: 1 (worth 10%)
Final Exam: 1 (worth 50%)

12.Learning and Teaching Resources	
Required textbooks (curricular books, any)	Hermiz,A.H.(1989),"Mathematical Statistics ", Directorate of Dar Al-Kutub Printing and Publishing, University Mosul, Iraq
Main references (sources)	School, P., Louisville, KY, (201 "Probability and mathematical statistics",
Recommended books and references (scientific journals, reports...)	Hog, R.V. and Craig, A.T. (1978 Introduction to mathematical statistics fourth edition, Macmillan Publishing C Inc. NEW YORK
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Hayfa Abdul Jawad Saieed

Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025
Course Description Form

1. Course Name:	
	Mathematical Statistics II
2. Course Code:	
	CMSI25-F3111
3. Semester / Year:	
	Second semester
4. Description Preparation Date:	
	February 10th 2025
5. Available Attendance Forms:	
	In-class
6. Number of Credit Hours (Total) / Number of Units (Total)	
	Lecture hours: 3 hours, Recitation: 1 hour, Credit: 3 Credit
7. Course administrator's name (mention all, if more than one name)	
	Name: Dr. Hayfa Abdul Jawad Saieed
	Email: hayfaajwad.65@uomosul.edu.iq
8. Course Objectives	
Course Objectives	1. Applying all the vocabulary of mathematical statistics 1 to discrete an continuous distributions.
	2. Recognizing the applications of each distribution.
	3. Studying the distributions of linear combinations of single and more than one independent variable by using mgf, cdf, and transformation

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College of Computer Science and Mathematics
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Department of Statistics and Informatics

Lecturer's name: Dr. Hayfa Abdul Jawad Saieed

Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

	techniques.
	4. Studying the importance of sampling distributions in different fields o statistics especially confidence intervals and hypothesis testing.
	5. Studying the importance of order statistics and their distributions and properties.
	6. Studying the importance of the central limit theorem which is import in studying distributions of estimators, tests, and other properties in la samples.

9. Teaching and Learning Strategies	
Strategy	Encouraging students to participate in the class through discussion a solving exercises, while improving and expanding their critical thinki skills through reports and using software to calculate cumulat probabilities, moments, or drawing probability functions. Also linking knowledge, they receive with the subjects that they studied in previ levels and the levels that they will turn to later.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week	4	Discrete distribution Uniform and Bernoul distribution.	Lecture_01	Lecture	Homework

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Academic title: Assistant professor

Academic qualification: PhD

Stage : 3rd year
Subject: Mathematical Statistics 1&2

Email: hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

Week	4	Binomial distribution.	Lecture_02	Lecture	Homework
Week	4	Poisson distribution	Lecture_03	Lecture	Homework
Week	4	Geometric distribution.	Lecture_04	Lecture	Homework
Week	4	Continuous distributions uniform Distribution Methods of finding distribution of functions of random variables.	Lecture_05	Lecture	Homework
Week	4	Normal distribution.	Lecture_06	Lecture	Homework
Week	4	Midterm exam	---	---	Test
Week	4	Gamma distribution	Lecture_07	Lecture	Homework
Week	4	Distributions of nonlinear functions of independent continuous random variables.	Lecture_08	Lecture	Homework
Week 10	4	Transformation technique in discrete distributions	Lecture_09	Lecture	Homework
Week 11	4	Chi square distribution	Lecture_10	Lecture	Homework
Week 12	4	Student t distribution	Lecture_11	Lecture	Homework

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Hayfa Abdul Jawad Saieed

Academic title: Assistant professor

Academic qualification: PhD

Stage : 3ʳᵈ year
Subject: Mathematical Statistics 1&2

Email:
hayfaajwad.65@uomosul.edu.iq

Academic year 2025-2025

Week 13	4	F distribution	Lecture_12	Lecture	Homework
Week 14	4	Order statistics, distribution of single order statistic.	Lecture_13	Lecture	Homework
Week 15	4	Distribution of functions of order statistics.	Lecture_14	Lecture	Homework
Week 16	4	Final Exam	---	---	Test

11.Course Evaluation

Quizzes: 2 (worth 10%)

Assignments: 2 (worth 10%)

Open-book exams: 5 (worth 10%)

Reports: 1 (worth 10%)

Midterm Exam: 1 (worth 10%)

Final Exam: 1 (worth 50%)

12.Learning and Teaching Resources

Required textbooks (curricular books, any)	Hermiz,A.H.(1989),"Mathematical Statistics ", Directorate of Dar Al-Kutub Printing and Publishing, University Mosul, Iraq
Main references (sources)	School, P., Louisville, KY, (201

Academic year 2025-2025

	"Probability and mathematical statistics",
Recommended books and references (scientific journals, reports...)	Hog, R.V. and Craig, A.T. (1978 Introduction to mathematical statistics fourth edition, Macmillan Publishing C Inc. NEW YORK
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.ZINAH MUDHAR
Academic title: Teacher
Academic qualification: Ph.D.
Email: Zeenamudhar@uomosul.edu.iq

Stage : THIRD
Subject: OPERATION RESEARCH

2024-2025
Course Description Form

1. Course Name
:Operation Research1

2. Course Code: :
CMSI23-F3151

3. Semester / Year
:First/2022-2023

4. Available Attendance Forms
: third Hall in the department of Informatic & Statistics

5. Number of Credit Hours (Total) / Number of Units (Total)
4Hrs/ 3 unit

6. Course administrator's name (mention all, if more than one name)
Name: Dr.Zinah mudher yeahya Email: Zeenamudhar@uomosul.edu.iq

7. Course Objectives

Course Objectives	• **Assisting managementin making optimal decisions.....** • **Building & solving the mathematical model** • **Learn about Sensitivity Analysis to identify how much variations in the input values for a given variable impact the results for a mathematical model**

8. Teaching and Learning Strategies

Strategy	

9. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Operation resear	Introduction to operation Research: the basic concepts, & Definition	In the hal	DAILY MONTHLY EXAM

Stage : THIRD

Subject: OPERATION RESEARCH

2024-2025

2	4	Linear programming	Linear programming Concept	Inthe hall	DAILY MONTHLY EXAM
3	4	Mathematical mo	Scientific &mathematical formula of linear programming model	Inthe hall	DAILY AND MONTHLY EXAM
4	4	Building L.P models with application	Building L.P models with application	In the hal	DAILY MONTHLY EXAM
5	4	Solve the L.P. model, Graphical method	Solve the L.P. model, Graphical method	Inthe hall	DAILY MONTHLY EXAM
6	4	Special case graphical	Special case in graphical method No feasible solution, Multi – optimal solution, Unbounded solution, Degeneracy	Inthe hall	DAILY MONTHLY EXAM
7	4	Simplex	Solve the L.P by using simplex method	In the hal	DAILY MONTHLY EXAM
8	4	Special case simplex	Special case in simplex method, No feasible solution, Multi – optimal solution, Unbounded solution, Degeneracy	Inthe hall	DAILY MONTHLY EXAM
9	4	M- Technique	M- Technique	Inthe hall	DAILY MONTHLY EXAM
10	4	Dual model	Dual model	In the hal	DAILY MONTHLY EXAM
11	4	Finding the optimal solution of dual model from the primal model &also vice versa	Finding the optimal solution of dual model from the primal model &also vice versa	Inthe hall	DAILY MONTHLY EXAM
12	4	Dual simplex	Dual simplex method,building model& solution technology	Inthe hall	DAILY MONTHLY EXAM
13	4	Sensitivity Anal or post optima analysis	Change in objective function coefficients :,coefficients of basic	In the hal	DAILYAND MONTHLY EXAM

Ministry of Higher Education and Scientific Research
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Lecturer's name: Dr.ZINAH MUDHAR
Academic title: Teacher
Academic qualification: Ph.D.
Email: Zeenamudhar@uomosul.edu.iq

Stage : THIRD

Subject: OPERATION RESEARCH

2024-2025

			&non basic variables			
14	4	Sensitivity Anal or post optima analysis	Change in right side coefficients		Inthe hall	DAILY MONTHLY EXAM

10.Course Evaluation

Endeavor score: 40. Exam score. Course: 60. Final score: 100

11.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Operation Research
Main references (sources)	**Hamdy taha(2011)Operation research "an introduction"** Hiller&Liberman(1995)Introduction operations Research
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.ZINAH MUDHAR
Academic title: Teacher
Academic qualification: Ph.D.
Email: Zeenamudhar@uomosul.edu.iq

Stage : THIRD
Subject: OPERATION RESEARCH

2024-2025
Course Description Form

1.	Course Name:	
	Operation Research 2	
2.	course Code: :	
	CMSI23-F3251	
3.	Semester / Year:	
	Second/2022-2023	
4.	Available Attendance Forms:	
	third Hall in the department of Informatic & Statistics	
5.	Number of Credit Hours (Total) / Number of Units (Total))	
	4hr/3unit	
6.	Course administrator's name (mention all, if more than one name)	
	Name: Dr. zinah mudher yehya Email: Zeenamudhar@uomosul.edu.iq	
7.	Course Objectives	

Course Objectives	
	• Learn about TRANSPORTATION Problem to minimize total cost
	• Learn about Network Analysis to minimize total project cost and minimize total project duration
	• Recognize the intention of Game theory to produce optimal decision -making of independent and competing actors in a strategic setting

Ministry of Higher Education and Scientific Research
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Lecturer's name: Dr.ZINAH MUDHAR
Academic title: Teacher
Academic qualification: Ph.D.
Email: Zeenamudhar@uomosul.edu.iq

Stage : THIRD

Subject: OPERATION RESEARCH

2024-2025

	Recognize the intention of Storage theory to produce optimal decision -making of independent and competing actors in a strategic setting &minimizing the total cost

21	Teaching and Learning Strategies
Strategy	The main strategy that will be adopted is to encourage student participation in solving exercises, and at the same time improve a expand their critical thinking skills so that the student learns to he management by making optimal decisions with the highest profit a lowest possible cost using game theory and also learns to find th optimal time to complete projects through networks. Business ar the student learns to transport goods at the lowest cost and the shortest path. One of the important topics that the student must le is the theory of storage in order to determine the optimal storage, optimal demand, and the reorder point at the lowest cost to mee future needs.

2 2	Course Structure

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
	4	Transportation	Definition of Transportat model,	In The hall	
	4	Optimal sol. of transportation	Test the optimal Transportation problem	in t hall	
	4		Balanced Transportation problem	in t hall	
	4	Network Analysis &network drawin	Drawing network	in t hall	

Stage : **THIRD**

Subject**: OPERATION RESEARCH**

2024-2025

		rules			
	4	Critical p method(CPM (Forward& backward soluti of critical bath)	Computation of CPM (Early & time)	in t hall	
	4	PERT network	PROGRAM EVALUTI &REVIEW TECHNIQUE	in t hall	
	4	Game theory	**Game theory**	in t hall	
	4	Solution method	Create &solve a matrix of came the	in thel	
	4	Optimal solution two players	optimal solution of Two-pers zero- sum Games	in t hall	
	4	Graphical method &gan theory	Solve game matrix graphically 2*m &m*2 order	in t hall	
	4	Linear Programming &Game theory	Solve the game matrix of or (m*n)by L.P.	in t hall	
	4	Storage Theory	Def.&Type of storage	in tl	
	4	Purchase modelw out shortage &w shortage	Compute the optimal storage w min.cost	in t hall	
	4	Product moc without shorta &with shortage	Compute the optimal storage w min.cost	in t hall	
2 2	Course Evaluation				
	Endeavor score: 40. Exam score. Course: 60. Final score: 100				
2 3	Learning and Teaching Resources				
Required textbooks (curricular books, if any)			Operation Research		
Main references (sources)			**Hamdy taha(2011)Operation research "an introduction"**		

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.ZINAH MUDHAR
Academic title: Teacher
Academic qualification: Ph.D.
Email: Zeenamudhar@uomosul.edu.iq

Stage : THIRD

Subject: OPERATION RESEARCH

2024-2025

	Hiller&Liberman(1995)Introduction operations Research
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Mhasen Saleh Altalib

Academic title: Lecturer

Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3ʳᵈ year
Subject: Biostatistics 1&2

Academic year 2024-2025
Course Description Form

1. Course Name:	
	Biostatistics 1
2. Course Code:	
	CMSI25-F31314
3. Semester / Year:	
	2024-2025
4. Description Preparation Date: 15/2/2025	
5. Available Attendance Forms:	
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: Mhasen Saleh Altalib Email: mhasenaltalib@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	1. This course aims to provide the student with basic information and scientific training in the field of biostatistics through the application of many types of important statistical methods in data analysis, especially in the field of science and statistical applications in the field of clinical medicine, as well as benefiting from it in other fields 2. Familiarize yourself with the subject of statistical hypothesis testing, when it is applied, the extent to which its results are benefited, and what are the

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Department of Statistics and Informatics

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Academic title: Lecturer

Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

	statistical terms that must be recognized (such as the level of significance, error of the first and second kind, types of hypotheses .....) in order to define the hypothesis and apply it correctly, which leads to a decision Correct decision.
	3. What is the statistical hypothesis, what does it consist of, and what is its statistical formula.
	4. Identifying the types of tests: for one community, two communities, or more, and what are the statistical characteristics of this community.
	5. What are the parameters being tested, mean, ratio or variance...
	6. Study population data through standard and clinical life tables.

9. Teaching and Learning Strategies	
Strategy	Encouraging students to participate in the class throu[gh] discussion and solving exercises, while improving a[nd] expanding critical thinking skills through reports and usi[ng] programs to calculate the statistical laboratory, as well as link[ing] the knowledge they receive with the materials they studied [in] previous levels and the levels they will turn to later.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	1. There are two possible outcomes of hypothesis testing: The null hypothesis,	Hypothesis testi[ng] definitions w[ith] general concepts	Live meeting-whiteboard	Daily Exams
Second			Building hypotheses: null hypothesis a[nd]		And a semester exam

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Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

Third		H0, is rejected, in which case we have evidence that supports the alternative hypothesis. Do not reject the null hypothesis H0, as in this case we do not have sufficient evidence to support the alternative hypothesis.	the alternat hypothesis w testing from side and from t sides, error of first and seco kind, and power of statistical test.	
Fourth		2. Learn about the statistical hypothesis and how to formulate it.	Test criterion: T steps involved testing hypothesis.	
		3. Errors of the first and second types	Tests related averages: A t related to average in the c of large samples.	
Fifth		4. Great level 5. Areas of rejecting and accepting the null hypothesis	Tests related averages: a t related to average, analy hypotheses applied examp related to average test in case of sm samples.	
Sixth		6. The statistical laboratory, its	Difference of two means	

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Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

Seventh		types and uses 7. Collect data from the sample and calculate its laboratory statistical value 8. How to make a decision. 9. Types of tests (parametric) For small and large samples. a) Test of means (one mean, two means, more than two means (one-way and two-way analysis of variance)) b) Variance testing (single variance, two variances, and multiple variances)	tests: The difference between two means using large samples. Z-test		
			Difference of two means tests: The difference between two means using small samples t-test and test the difference between two related means. t-tailed.		
Eight			Testing difference betwe more than t means: Introduction- analysis variance - one-w and two-way.		
Nineth		C) Proportions test (one ratio, two ratios). D) Testing the	One-way analysis to estimate covariance		

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Academic title: Lecturer

Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

		variance of communities	model parameters.		
Tenth			Two-way analysis of variance and practical examples.		
			A test related to proportions for a population with a binomial distribution - for one sample + applied examples		
Eleventh			Test related to proportions for a population with a binomial distribution - for one sample + applied examples.		
Twelfth			Testing the difference between two ratios / applied examples..		
Thirteenth			Standard deviation and		

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Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

			variance tests: Testing the variance of a single population.		
Fourteenth			A test for homogeneity of variances between two independent estimates.		
Fifteenth			Standard deviation and variance tests: A test for the equality of several variances.		

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

12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Al-Rawi, Khasha'a Mahmoud (1998) "Introduction to the Principles of Statistics", first edition, Ibn Al-Atheer Press, University of Mosul-Iraq. 2. Prof. Kamal Alwan Khalaf and Prof. Dr. Emad Hazim (2009)

	"Testing Statistical Hypotheses", Al Jazeera Printing and Publishing Office - Baghdad.
Recommended books and references (scientific journals, reports...)	3e- Daryl S. Paulson, (200 "Biostatistics and Microbiolog Bioscience Labortoies Bozeman, N USA.
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Mhasen Saleh Altalib

Academic title: Lecturer

Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

Course Description Form

1. Course Name:
Biostatistics 2

2. Course Code:
CMSI25-G3231

3. Semester / Year:
second 2024-2025

4. Description Preparation Date:
15/2/2025

5. Available Attendance Forms:

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: Mhasen Saleh Altalib Email: mhasenaltalib@uomosul.edu.iq

8. Course Objectives	
Course Objectives	1-This course aims to provide the student with basic information and scientific training in the field of biostatistics through the application of many types of important statistical methods in data analysis, especially in the field of science and statistical applications in the field of clinical medicine, as well as benefiting from it in other fields.

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
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Lecturer's name: Dr. Mhasen Saleh Altalib

Academic title: Lecturer

Academic qualification: PhD

Email: mhasenaltalib@uomosul.edu.iq

Stage : 3ʳᵈ year
Subject: Biostatistics 1&2

Academic year 2024-2025

	2) Distinguish between vital statistics and vital statistics.
	3) Studying population data through both standard and clinical life tables.
	4) Study the survival data and their statistical distributions and analyze them.
	5) Knowing how to verify the results of laboratory analyzes, the accuracy of these analyzes, and the consistency of results between health units such as hospitals and analysis laboratories.
	6) How to calculate and use the appropriate dose for any vacci treatment, or insecticide, i.e. in general, any medical drug.

9. Teaching and Learning Strategies

Strategy	Encouraging students to participate in the class throu discussion and solving exercises, while improving and expandi critical thinking skills through reports and using programs calculate the statistical laboratory, as well as linking knowledge they receive with the materials they studied previous levels and the levels they will turn to later.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	1. Biostatistics is the application of statistics a wide range of topics i biology. Biostatistics includes designing biological tests,	biostatistics: definitions with general concepts.	Live meeting-whiteboard	Daily Exams And a semester exam
Second	3		Birth and		

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Email: mhasenaltalib@uomosul.edu.iq

Stage : 3ʳᵈ year
Subject: Biostatistics 1&2

Academic year 2024-2025

		especially in medicine and agriculture, collecting, summarizing and analyzing information from these experiments, interpreting results and drawing conclusions from them. The terms "biometric" or "biometric" can also be used as synonyms for vital statistics. 2. Identify the areas application biostatistics, including Public health - including epidemiology research health services research nutrition, a environmental health Medicine - clinical t design and analys Genetics, genetics, a genetic statistics th attempt to rela abnormalities in genoty with phenotype. T results of these research were applied in the fiel of agriculture to impro the quality and quanti of crops and the breedi	death rates.		
Third	3		disease rates and Practica examples.	
Fourth	3		Measure of the relationship between life factors - Practical examples.	
Fifth	3		Comparing two rates of death from a particular cause.	
Sixth	3		Fisher's exac test for comparison of two rates- Practical examples.	
Seventh	3		Usual and clinical life schedule.	
Eight	3		Comparison of two sets o survival data	

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

Nineth	3	of farm animals. It applied in biomedic research to find alleles a gene responsible f genetic diseases. 3. Learn about laboratory analyzes and how to verify the validity of their results through some statistical tests. 4. How to conduct vi tests, the effectiveness o medical drugs such as a vaccine, treatment or pesticide... 5. Comparison of dea rates for a particular cause. 6. Confirming the seriousness of diseases and indicating which of them is more risk, in addition to studying another reason for increasing this risk. 7. Determine the confidence limits for relative severity 8. Learn how to calculate and use the appropriate dose for any	Comparison of two sets o survival dat Relative Ris estimation for a single study with confidence limits.	
Tenth	3		General relative risk estimation with confidence limits-Practical examples	
Eleventh	3		Laboratory analyzes - concordance between the results of tw laboratories.	
Twelfth	3		Matching in terms of effectivenes sensitivity and accuracy	
Thirteenth	3		Matching in terms of	

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Email: mhasenaltalib@uomosul.edu.iq

Stage : 3rd year
Subject: Biostatistics 1&2

Academic year 2024-2025

		vaccine, treatment, or insecticide, i.e. in gener any medical drug.	sensitivity and accuracy -double test
Fourteenth	3	9. How to determine vital tests- Estimate the median dose.	vital tests- Estimate the median dose Practical examples
Fifteenth	3	Analyze survival data - li function, death functi and hazard function, a the relationship betwe these functions.	Analyze survival data - life function, death function and hazard function, and the relationship between these functions.

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

12.Learning and Teaching Resources	
Required textbooks (curricular books, if any	
Main references (sources)	3. Al-Rawi, Khasha'a Mahmoud (1998) "Introduction to the Principles of Statistics", first edition, Ibn Al-Atheer Press, University of Mosul-Iraq.

Academic year 2024-2025

	2. Prof. Kamal Alwan Khalaf and Prof. Emad Hazim (2009) "Testing Statisti Hypotheses", Al Jazeera Printing Publishing Office - Baghdad.
Recommended books and references (scientific journals, reports...)	3e- Daryl S. Paulson, (2008); "Biostatist and Microbiology" Bioscience Laborto Bozeman, MT, USA.
Electronic References, Websites	

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025
Course Description Form

1. Course Name:	
OPERATION Research (1) / THIRD stage	
2. Course Code:	
CMSI25-F3151	
3. Available Attendance Forms:	
Classrooms in the Department of Statistics and Informatics	
4. Number of Credit Hours (Total) / Number of Units (Total)	
3 theoretical hours and 1 discussion hours/number of units: 3	

5. Course Objectives

Course Objectives	• The main objective of operations research is to help management make optimal decisions related to administrative problems. • Building a mathematical model for a real problem and relying on it, solving the mathematical model and testing the optimum • Finding a sensitive analysis of the model and its suitability for future changes

6. Teaching and Learning Strategies

Strategy	Lectures and exercises in the classroom Video lectures on YouTube Homework and assignments on the Classroom platform and reports prepared by students

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3 theoretical + 1 discussion	Operation research	Operation Research: Introduction& Definition	Blackboard	Daily and monthly exams
Week 2	3 theoretical + 1 discussion	near programming	Linear programming Concept	Blackboard	Daily and monthly exams
Week 3	3 theoretical +1discussion	near programming model	Scientific &mathematical formula of linear	Blackboard	Daily and monthly exams

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.Zinah .M.Y.
Academic title: Teacher
Academic qualification: Ph.D.
Email: zeenamudhar@uomosul.edu.iq

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025

			programming model		
Week 4	3 theoretical + 1 discussion	Building model	mid-term exam +Building L.P models with application	Blackboard	Daily and monthly exams
Week 5	3 theoretical +1 discussion	Graphical methood	Solve the L.P. model, Graphical method	Blackboard	Daily and monthly exams
Week 6	3 theoretical +1 discussion	Special case in graphical methood	Special case in graphical method No feasible solution, Multi – optimal solution, Unbounded solution, Degeneracy	Blackboard	Daily and monthly exams
Week 7	3 theoretical + 1 discussion	simplex method	Solve the L.P using simplex method	Blackboard	Daily and monthly exams
Week 8	3 theoretical +1 discussion	special case in simplex method	Special case in simplex method, No feasible solution, Multi – optimal solution, Unbounded solution, Degeneracy	Blackboard	Daily and monthly exams
Week 9	3theoretical + 1discussion	M- Technique	M- Technique	Blackboard	Daily and monthly exams
Week 10	3 theoretical + 1 discussion	Dual model	Mid-term Exam + Dual model	Blackboard	Daily and monthly exams
Week 11	3 theoretical + 1 discussion	finding the optimal solution of dual model from the primal model &also vice versa	Finding the optimal solution of dual model from the primal model &also vice versa	Blackboard	Daily and monthly exams
Week 12	3theoretical + discussion1	Dual simplex	Dual simplex method, building model& solution technology	Blackboard	Daily and monthly exams
Week 13	3 theoretical + 1 discussion	sensitivity Analysis	Change in objective function coefficients	Blackboard	Daily and monthly exams

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.Zinah .M.Y.
Academic title: Teacher
Academic qualification: Ph.D.
Email: zeenamudhar@uomosul.edu.iq

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025

		or optimality Analysis	:,coefficients of basic &non basic variables		
Week 14	3 theoretical + 1 discussion	Sensitive analysis	Change in right side coefficients	Blackboard	Daily and monthly exams
Week 15	3 theoretical + 1 discussion	Mid-term Exam+ Change the coefficients of the variables of the constraint .matrix	Mid-term Exam + Change the coefficients of the variables of the constraint matrix.	Blackboard	Daily and monthly exams

8. Course Evaluation

Endeavor score: 40. Exam score. Course: 60. Final score: 100

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	بحوث العمليات/عبد ذياب جزاع **مدخل الى بحوث العمليات/حامد سعد نور الشمرتي وعلي خليل الزبيدي(2007)**
Main references (sources)	**Hamdy taha(2011)Operation research "an an introduction"** Hiller&Liberman(1995)Introduction to operations Research
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.youtube.com/channel/UCh-Sp-H5_OiJjfR85PIvm1w/

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr.Zinah .M.Y.
Academic title: Teacher
Academic qualification: Ph.D.
Email: zeenamudhar@uomosul.edu.iq

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025
Course Description Form

1. Course Name:
Operation Research (2) / Third stage

2. Course Code:
CMSI25-F3251

3. Available Attendance Forms:
Classrooms in the Department of Statistics and Informatics

4. Number of Credit Hours (Total) / Number of Units (Total)
3 theoretical hours and 1 discussion hours/number of units: 3

5. Course Objectives	
Course Objectives	• The main goal of operations research is to help management make optimal decisions related to administrative problems. • Finding the shortest path with the lowest cost for transportation problems. Representing projects using business networks and calculating project completion times with the lowest cost. • Using game theory to find optimal strategies that achieve the highest profit (minimum loss) for competing companies. • Using inventory theory to determine the optimal quantity of needs with the lowest cost.

6. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted is to encourage students' participation in solving exercises, and at the same time improve and expand their critical thinking skills so that the student learns to help management make optimal decisions with the highest profit and lowest possible cost using game theory. He also learns to "find the optimal time to complete projects through business networks" and the student learns to transport goods at the lowest cost and shortest path. One of the important topics that the student must learn is the inventory theory to determine the optimal inventory, optimal demand, and reorder point at the lowest cost to meet future needs.

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025

7. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	3 theoretical + 1 discussion	Definition of nsportation model And Solve transportation problems with the northwest corner hod, min cost and vogels	Definition of Transportation model And Solve transportation oblems with the orthwest corner ethod, min cost and vogels	Blackboard	Daily and monthly exams
Week 2	3 theoretical + 1 discussion	Optimal sol. of trransportation	transportation problem- stepping stone method	Blackboard	Daily and monthly exams
Week 3	3 theoretical + 1 discussion	Balanced Transportation problem	Balanced Transportation problem	Blackboard	Daily and monthly exams
Week 4	3 theoretical +1 discussion	Network Analysis &network drawing rules	Drawing network	Blackboard	Daily and monthly exams
Week 5	3 theoretical + 1 discussion	Critical path method(CPM (Forward& backward solution of critical bath)	Computation of CPM (Early &late time)	Blackboard a	Daily and monthly exams
Week 6	3 theoretical +1 discussion	PERT network	PROGRAM EVALUTION &REVIEW TECHNIQUE	Blackboard	Daily and monthly exams
Week 7	3 theoretical +1 discussion	Game theory	Game theory	Blackboard	Daily and monthly exams
Week 8	3theoretical + 1 discussion	Solution method	Create &solve a matrix of came theory	Blackboard	Daily and monthly exams
Week 9	3 theoretical +1 discussion	imal solution of two players	optimal solution of Two-persons zero- sum Games	Blackboard	Daily and monthly exams
Week 10	3 theoretical	phical method	Solve game matrix	Blackboard	Daily and monthly

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Lecturer's name: Dr.Zinah .M.Y.
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Email: zeenamudhar@uomosul.edu.iq

Stage : third
Subject: OPERATION RESEARCH

For the academic year 2024-2025

	+1 discussion	&game theory	graphically of 2*m &m*2 order		exams
Week 11	3theoretical + 1 discussion	ar Programming &Game theory	Solve the game matrix of order (m*n)by L.P.	Blackboard	Daily and monthly exams
Week 12	3 theoretical +1 discussion	Storage Theory	Def.&Type of storage	Blackboard	Daily and monthly exams
Week 13	3 theoretical + 1 discussion	chase modelwith shortage &with shortage	Compute the optimal storage with min.cost	Blackboard	Daily and monthly exams
Week 14	3 theoretical + 1 discussion	MID -TERM- M+Product model without shortage &with shortage	MID-TERM-EXAM+Compute the optimal storage with min.cost	Blackboard	Daily and monthly exams

8. Course Evaluation

Endeavor score: 40. Exam score. Course: 60. Final score: 100

9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	بحوث العمليات/عبد ذياب جزاع **مدخل الى بحوث العمليات/حامد سعد نور الشمرتي وعلي خليل الزبيدي(2007)**
Main references (sources)	**Hamdy taha(2011)Operation research "an an introduction"** Hiller&Liberman(1995)Introduction to operations Research
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.youtube.com/channel/UCh-Sp-H5_OiJjfR85PIvm1w/

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics
Stage : Third
Subject: Reliability

Lecturer's name: Khalida Ahmed Mohammed
Academic title: Lecture

Academic qualification: Ph.D

Email: khalida@uomosul.edu

For the academic year 2024-2025
Course Description Form

1. Course Name:
Reliability/Third phase
2. Course Code:
CMSI25-F3141
3. Available Attendance Forms:
Classrooms of department statistical and informatics
4. Number of Credit Hours (Total) / Number of Units (Total)
(3) theoretical hours and (1) discussion hours/number of units: 3

5.	
Course Objectives	**Explain all the functions related of reliability. Define the importance lifetime distributions then compute all the function related of(reliability ,MTTF,median time to failure ,mode design life…ext).Compute reliability function of systems(series,parallel and companied).** •

6. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials by by taking applied examples in the field of engineering reliability

7.   Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	**3(T) +1(D)**	The reliability function, mean time to failure ,hazard function bathtubcurve	The related reliability functions	Blackboard	Daily, semester and fi exams - Duties Student participatio

Ministry of Higher Education and Scientific Research
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Lecturer's name: Khalida Ahmed Mohammed
Academic title: Lecture

Academic qualification: Ph.D

Email: khalida@uomosul.edu

Stage : Third
Subject: Reliability

For the academic year 2024-2025

Second	**3(T) +1(D)**	The conditional reliability-design life and failure mode,their relationship of all these function and examples	The related reliability functions	Blackboard	Daily, semester and final exams - Duties Student participation
Third	**3(T) +1(D)**	Constant failure rate-The exponential reliability function – Failure with CFR-Memorylessness-Failure modes-Failure modes with CFR	The exponential distribution and their related functions	Blackboard	Daily, semester and final exams - Duties Student participation
Fourth	**3(T) +1(D)**	Failure on demand-redundancy and CFR model -applications	Failure modes and exponential distribution	Blackboard	Daily, semester and final exams - Duties Student participation
Fifth	**3(T) +1(D)**	Time dependent failure models-The Weibull distribution-Design median and mode-Burn-in screening	Weibull distribution (Time dependent failure rate)	Blackboard	Daily, semester and final exams - Duties Student participation
Sixth	**3(T) +1(D)**	Semester exam		Blackboard	Daily, semester and final exams - Duties Student participation
seventh	**3(T) +1(D)**	Failure modes-Identical Weibull process	Failure modes	Blackboard	Daily, semester and final exams - Duties Student participation
Eghith	**3(T) 1(D)**	Derive all the characteristic functions related to the reliability of time dependent models	The Weibull distribution (Time dependent failure rate)	Blackboard	Daily, semester and final exams - Duties Student participation
nineth	**3(T) +1(D)**	Redundancy with failure rate-and Application	Redundancy and Weibull distribution	Blackboard	Daily, semester and final exams - Duties Student participation

Ministry of Higher Education and
Scientific Research
College of Computer Science and
Mathematics
University of Mosul
Department of Statistics and
Informatics

Lecturer's name: Khalida
Ahmed Mohammed
Academic title: Lecture

Academic qualification: Ph.D

Email: khalida@uomosul.edu

Stage : Third
Subject: Reliability

For the academic year 2024-2025

Tenth	**3(T) +1(D)**	Reliability system. Serial configuration., Parallel configuration**.**	Reliability system	Blackboard	Daily, semester and final exams - Duties Student participation
Eleventh	**3(T) +1(D)**	Combined series-parallel systems-redundancy High levels verses low-level	Reliability system	Blackboard	Daily, semester and final exams - Duties Student participation
Tweleveth	**3(T) +1(D)**	System structure function ,minimal cut and minimal paths(optimal)	Reliability system	Blackboard	Daily, semester and final exams - Duties Student participation
Thirteenth	**3(T) +1(D)**	Complex systems	Reliability system	Blackboard	Daily, semester and final exams - Duties Student participation
Fourteenth	**3(T) +1(D)**	Compute the reliability of complex system	Reliability system	Blackboard	Daily, semester and final exams - Duties Student participation

8. Course Evaluation
Semester Exam 40% ,Final Exam 60%
9. Learning and Teaching Resources

Required textbooks (curricular books, if any)	An introduction to reliability
Main references (sources)	Charles,E.E(1997),An introduction to reliabil Engineering
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https:llcoeng.uobaghdad.edu.iq https:coeng,uobaghdad.edu.iq

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Dr. Manaf Hazim A.

Academic title: Lecturer

Academic qualification: Ph.D.

Email: manaf.ahmed@uomosul.edu.iq

Stage : Third
Subject: Queuing Theory

For the academic year 2024-2025
Course Description Form

1. Course Name:
Queueing Theory
2. Course Code:
CMSI23-F3171
3. Semester / Year:
The first academic course
4. Available Attendance Forms:
Classrooms in the Department of Statistics and Informatics
5. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical hours and 2 discussion hours/number of units: 3
6. Course Objectives

Course Objectives	The objectives of the course are to provide students with fundamental concepts in queueing theory and its practical applications.

7. Teaching and Learning Strategies	
Strategy	• Understanding key queueing theory terms and concepts, such as arrival rate, service rate, and waiting time. • Studying various queueing models, starting from simple models like M/M/1 and progressing to more complex scenarios. • Practicing problem-solving to reinforce theoretical concepts and compute performance metrics. • Exploring the application of queueing theory in different industries through case studies. • Engaging in hands-on exercises involving the design and optimization of queueing systems.

8. Course Structure

Stage : Third
Subject: Queuing Theory

For the academic year 2024-2025

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2 theoretical + 2 discussion	Introduction to Queueing Theory	Introduction to Queueing Theory	Blackboard and PowerPoint	Assignment
Week 2	2 theoretical + 2 discussion	Characteristics of Queueing Models	Characteristics of Queueing Models	Blackboard and PowerPoint	Assignment
Week 3	2 theoretical + 2 discussion	Probability Distributions in Queueing	Probability Distributions in Queueing	Blackboard and PowerPoint	Assignment
Week 4	2 theoretical + 2 discussion	Birth and Death Process	Birth and Death Process	Blackboard and PowerPoint	Assignment
Week 5	2 theoretical + 2 discussion	Single-Server System / Characteristics of a Single-Server Queue	Single-Server System / Characteristics of a Single-Server Queue	Blackboard and PowerPoint	Assignment
Week 6	2 theoretical + 2 discussion	Single-Server System / Steady-State Distribution, Key Performance Indicators	Single-Server System / Steady-State Distribution, Key Performance Indicators	Blackboard and PowerPoint	Assignment
Week 7	2 theoretical + 2 discussion	Limited Capacity Single-Server Queueing System / System Probability Distribution, Key Performance Indicators	Limited Capacity Single-Server Queueing System / System Probability Distribution, Key Performance Indicators	Blackboard and PowerPoint	Assignment
Week 8	2 theoretical + 2 discussion	Limited Capacity Single-Server Queueing System / System Probability Distribution, Key Performance Indicators	Limited Capacity Single-Server Queueing System / System Probability Distribution, Key Performance Indicators	Blackboard and PowerPoint	Assignment
Week 9	2 theoretical + 2 discussion	Midterm Exam	Midterm Exam	Blackboard and PowerPoint	exams
Week 10	2 theoretical + 2 discussion	Practical Applications on Models	Practical Applications on Models	Blackboard and PowerPoint	Assignment
Week 11	2 theoretical + 2 discussion	Multi-Server Queueing System	Multi-Server Queueing System	Blackboard and PowerPoint	Assignment
Week 12	2 theoretical + 2 discussion	Multi-Server Queueing System with Limited Capacity / System	Multi-Server Queueing System with Limited Capacity /	Blackboard and PowerPoint	Assignment

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

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Stage : Third
Subject: Queuing Theory

For the academic year 2024-2025

		Probability Distribution, Key Performance Indicators	System Probability Distribution, Key Performance Indicators		
Week 13	2 theoretical + 2 discussion	Multi-Server Queueing System with Limited Capacity and Limited Source of Demand / System Probability Distribution, Key Performance Indicators	Multi-Server Queueing System with Limited Capacity and Limited Source of Demand / System Probability Distribution, Key Performance Indicators	Blackboard and PowerPoint	Assignment
Week 14	2 theoretical + 2 discussion	Multi-Server Queueing System / Practical Applications on Models	Multi-Server Queueing System / Practical Applications on Models	Blackboard and PowerPoint	Assignment
Week 15	2 theoretical + 2 discussion	Final Project: Discussion of Results	Final Project: Discussion of Results	Blackboard and PowerPoint	Assignment
Week 15	Final exam	Final Exam			Final Exam

9. Course Evaluation

Endeavor score: 40. Exam score. Course: 60. Final score: 100

10.Learning and Teaching Resources

Required textbooks (curricular books, if any)	نظرية الطوابير، د.عدنان عبد الرحمن بري 1989
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name:
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Stage :3rd
Subject: Data mining (1)

For the academic year 2024-2025
Course Description Form

1. Course Name:
Data mining (1)

2. Course Code:
CMSI25-F3231

3. Available Attendance Forms:
Attendance+Examination

4. Number of Credit Hours (Total) / Number of Units (Total)
2 + 2 Practice

5. Course Objectives
Introduction to the basic concepts of data mining from a statistical perspective

6. Teaching and Learning Strategies
Developing students on data mining, classification, and clustering by using statistical and machine learning methods

7. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		**Data Mining, definition, and introduction,**	**Blackboard and PowerPoint**	Assignment
Week 2	2		**Types of Data, Contingency Table**	**Blackboard and PowerPoint**	
Week 3	2		**Histogram, Scatter plot, and Box-plot., Quintiles and Probability Plot,**	**Blackboard and PowerPoint**	
Week 4	2		**Goodness of fits, Graph in**	**Blackboard and**	

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Stage :3rd
Subject: Data mining (1)

For the academic year 2024-2025

			Multivariate Variables,	PowerPoint	
Week 5	2		Data Transformations,	Blackboard and PowerPoint	
Week 6	2		Box-Cox Transformation,	Blackboard and PowerPoint	
Week 7	2		Measures of distance, Measures of Similarity	Blackboard and PowerPoint	Assignment
Week 8			1st Mid-course Exam		
Week 9	2		Clustering, definition and introduction,	Blackboard and PowerPoint	
Week 10	2		Hierarchical methods for clustering,	Blackboard and PowerPoint	Assignment
Week 11	2		Non- Hierarchical methods for clustering, R codes and their uses.	Blackboard and PowerPoint	
Week 12	2		Time Series Analysis	Blackboard and PowerPoint	
Week 13			2nd Mid-course Exam		
Week 14	2		Computer packages for statistical analysis		
Week 15	2		Real data and application		

8. Course Evaluation

40 for mid-course exam, 60 for final exam

9. Learning and Teaching Resources

Required textbo (curricular books, if any)	
Main references (sources	
Recommended books and references (scientific journals, reports...)	**Giudici, P. (2005).** *Applied data mining: statistical methods for business and industry*. **John Wiley & Sons.** **Nisbet, R., Elder, J., & Miner, G. (2009).** *Handbook of statistical analysis and data mining applications*. **Academic press.**
Electronic Referen Websites	

Ministry of Higher Education and Scientific Research
College of Computer Science and Mathematics
University of Mosul
Department of Statistics and Informatics

Lecturer's name: Hajer Akram
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Academic qualification: MSc.
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Stage : Third
Subject: English Language

For the academic year 2024-2025
Course Description Form

1. Course Name:	
	English Language / third stage
2. Course Code:	
3. Semester / Year:	
	The second academic course
4. Available Attendance Forms:	
	Classrooms in the Department of Statistics and Informatics
5. Number of Credit Hours (Total) / Number of Units (Total)	
	2 theoretical hours /number of units: 2

6. Course Objectives

Course Objectives	• To be able to speak English fluently and accurately. • To think in English and then speak. • To be able to talk in English. • To be able to compose freely and independently in speech and writing. • To be able to read books with understanding.

7. Teaching and Learning Strategies

Strategy	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, it enables the students for the use grammar correctly,

8. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2 theoretical	Reading passage: Are You Getting Enough Sleep?	Reading passage: Are You Getting Enough Sleep?	Blackboard	Daily and monthly exams
Week 2	2 theoretical	• Building Vocabulary • Doing exercises: A • Words to remember	• Building Vocabulary • Doing exercises:	Blackboard	Daily and monthly exams

Ministry of Higher Education and Scientific Research
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Department of Statistics and Informatics

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Stage : Third
Subject: English Language

For the academic year 2024-2025

			Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major	A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major		
Week 3	2 theoretical		9. Reading passage: Mika's Homestay in London. • Students would explain their assignments about their major.	• Reading passage: Mika's Homestay in London. • Students would explain their assignments about their major.	Blackboard	Daily and monthly exams
Week 4	2 theoretical		• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams
Week 5	2 theoretical		• Reading passage: It's Not Always Black and White. 10. Students would explain their assignments about their major.	• Reading passage: It's Not Always Black and White. • Students would explain their assignments about their major.	Blackboard	Daily and monthly exams
Week 6	2 theoretical		• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams
Week 7	2 theoretical		• Reading passage: Helping Others. 1. Students would explain their assignments about their major. 2.	• Reading passage: Helping Others. • Students would explain their assignments about their major. •	Blackboard	Daily and monthly exams

Stage : Third
Subject: English Language

For the academic year 2024-2025

Week					
Week 8	2 theoretical	• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams
Week 9	2 theoretical	• Reading passage: Generation Z: Digital Nations. 11. Students would explain their assignments about their major.	• Reading passage: Generation Z: Digital Nations. • Students would explain their assignments about their major.	Blackboard	Daily and monthly exams
Week 10	2 theoretical	• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams
Week 11	2 theoretical	• Reading passage: How to Be a Successful Businessperson. • Students would explain their assignments about their major.	• Reading passage: How to Be a Successful Businessperson. • Students would explain their assignments about their major.	Blackboard	Daily and monthly exams
Week 12	2 theoretical	Mid-term Exam.	Mid-term Exam.	Blackboard	Daily and monthly exams
Week 13	2 theoretical	• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams
Week 14	2 theoretical	12. Reading passage: The Growth of Urban Farming. 13. Students would explain their assignments about their major.	• Reading passage: The Growth of Urban Farming. • Students would	Blackboard	Daily and monthly exams

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Stage : Third
Subject: English Language

For the academic year 2024-2025

			explain their assignments about their major.		
Week 15	2 theoretical	• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	• Building Vocabulary • Doing exercises: A-B • Words to remember Ask Students (According to attendance list) to write a short paragraph or report related to their field and use technical terminologies to enhance their English within their major.	Blackboard	Daily and monthly exams

14.Course Evaluation

Endeavor score: 40. Exam score. Course: 60. Final score: 100

15.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Select Readings Teacher-approved readings for today's students pre-intermediate 2nd Ed. By: Linda Lee + Eric Gundersen
Main references (sources)	Select Readings Elementary
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.libgen.is/search.php?req=select+readings+pre-intermediate&open=0&res=25&view=simple&phrase=1&column=def