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

2026

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.

Academic Program Description Form

Faculty / Institute: College of science
Scientfic department: Mathematics and computer applications
Academic or professional name:B.Scs. in Mathematics and computer applications
Final certificate name: B.Scs. in Mathematics and computer applications
Academic system: coursat
Description preperation date: 9-2-2026

Signature :
Head of department:
Dr.Aws Nidhal Dheyab
Date : 10/2/2026

Signature :
Dean's assistance for scientfic affaires:
Dr.Sala abdul-khudhar hassan
Date : 11/2/2026

This file checked by:
Department of quality assurance and univercity performance
Director quality assurance and univercity performance
M.Sc Salih A. Lazam
Date 11/2/2026

Dean's approval

1. Program Vision

The department aspires to be a leader in providing innovative education that integrates theory and practice, while striving to achieve academic and research excellence in mathematics and information technology, to prepare graduates capable of competing in the labor market and contributing to sustainable development.

2. Program Mission

The department's mission is to provide high-quality education in the fields of mathematics and its applications, with the aim of preparing scientifically and practically qualified graduates by providing an educational environment that stimulates learning and creativity.

3. Program Objectives

The Department of Mathematics and Computer Applications aims to provide high-quality education that is consistent with recent developments in mathematics and information technology, with a focus on preparing a generation of academically and practically distinguished graduates capable of meeting academic and professional challenges. The department also seeks to promote scientific research and partnerships with the community and industry. To achieve these goals, the department works to achieve the following objectives:

1. Providing high-quality education: Offering distinguished academic programs that meet the needs of the labor market and enhance students' ability to solve complex problems in mathematics and computer applications. Efforts are made to instill a love of the specialty in students by highlighting the importance of mathematics and its applications in all scientific fields.
2. Preparing outstanding students for graduate studies: Preparing outstanding

students as a first step toward completing their graduate studies to obtain master's and doctoral degrees, in response to the community's need for this rare specialization.

3. Qualifying specialized personnel for the labor market: Preparing qualified personnel to work in various government institutions in the fields of mathematics, computers, operations research, and statistics. Graduates are also qualified to work as research assistants in mathematics and computer science departments at universities, a demand for them in secondary education.

4. Promoting Scientific Research: Encouraging faculty members and students to conduct innovative scientific research in pure and applied mathematics, and publishing the results of this research in prestigious scientific journals.

5. Developing Applied Skills: Enhancing students' practical skills through applied graduation projects and training programs, enabling them to effectively contribute to the application of mathematics in information technology and industry.

6. Building Partnerships with Community and Industry: Encouraging cooperation with the local community and industry by providing mathematical and technical solutions that contribute to improving quality of life and supporting sustainable development.

7. Stimulating Professional Development: Encouraging faculty members to enhance their academic and research level and work towards obtaining prestigious academic titles.

8. Establishing Graduate Programs: Working to develop the department to enable it to offer advanced graduate programs in mathematics and its applications, to meet the needs of the academic and professional community.

9. Improving the learning environment: Creating a stimulating learning environment based on innovation and interaction, enhancing the learning experience and preparing students for academic and professional excellence.

10. Developing critical and creative thinking skills: Training students to develop critical and creative thinking skills, while enhancing their ability to innovate in

solving mathematical and technical problems.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

5. Other external influences

It contributes to solving many dilemmas related to mathematical studies .

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**8**	**12**	**12%**	
College Requirements	**11**	**27**	**15-20**	
Department Requirements	**34**	**106**		
Summer Training				
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	**practical**
First	Math1101	Calculus I	#	
First	Math1102	Foundations of Mathematics I	#	
First	Math1103	Finite Mathematics	#	
First	COS1101	General Mechanic	#	#
First	UOM1101	Human Rights and	#	

		Democracy		
First	UOM1102	Computer I	#	#
First	Math1214	Calculus II	#	
First	Math1215	Foundations of Mathematics II	#	
First	COS1202	Pascal Programming	#	#
First	UOM1203	English Language I	#	
First	COS1203	Electrical Physics	#	#
First	COS1204	Logic Design for Computer	#	#
Second	Math2318	Advance Calculus I	#	
Second	Math 2319	Ordinary Differential Equations I	#	
Second	Math23010	Group Theory	#	
Second	Math 23111	Linear Algebra	#	
Second	COS2305	Programming C++	#	#
Second	UOM2314	Computer II	#	#
Second	Math 24114	Advance Calculus II	#	
Second	UOM2405	Ordinary Differential EquationsII	#	
Second	Math 24016	Arabic Language	#	
Second	COS2406	Probability and statistics	#	
Second	COS2407	MATLAB	#	#
Third	Math35118	Mathematical Analysis I	#	
Third	Math35119	Numerical Analysis I	#	#
Third	Math35120	Ring Theory I	#	
Third	Math35121	Partial Differential Equations	#	
Third	Math35122	Mathematical Statistic I	#	
Third	COS3518	Visual Basic	#	#
Third	Math36123	Mathematical Analysis II	#	
Third	Math36124	Numerical Analysis II	#	#
Third	Math36125	Ring Theory II	#	
Third	Math36126	Mathematical Statistics II	#	
Third	Math36027	Algorithms	#	
Third	UOM3616	English Language II	#	
Fourth	Math 47128	Topology I	#	
Fourth	Math47129	Complex Analysis I	#	
Fourth	Math47130	Functional Analysis	#	
Fourth	Math47031	Encryption	#	

Fourth	Math47132	Artificial Intelligent	#	
Fourth	UOM4707	Professional Ethics	#	
Fourth	Math48133	Topology II	#	
Fourth	Math 48134	Complex Analysis II	#	
Fourth	Math48135	Computer Security	#	
Fourth	Math48036	Operations Research	#	
Fourth	Math48137	Approximation Theory	#	
Fourth	Math48038	Graduation Project	#	

8. Expected learning outcomes of the program

Knowledge	
1- Acquire a good level of knowledge in the field of mathematics and computers 2- The student will be able to understand the basic topics in mathematics and their applications in the field of computers	
Skills	
The student will have good knowledge of the areas of use of mathematics in fields of knowledge and the ability to diagnose the problems he faces and how to address them	
Ethics	
- Graduating students with a high level of academic competencies to meet the needs of the labor market in the country - Developing study plans at the bachelor's level to keep pace with scientific developments and the latest developments of the times	

9. Teaching and Learning Strategies

Theoretical applied lectures, scientific seminars, laboratory applications, in addition to the training courses held by the department

10. Evaluation methods

Through weekly and quarterly examinations, in addition to scientific reports.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistant lecture	Mathematics and computers	Types of specializations			#	
Lecturer	Mathematics and computers	Types of specializations			#	
Assistant Professor	Mathematics and computers	Types of specializations			#	
Professor	Mathematics and computers	Types of specializations			#	

Professional Development

Mentoring new faculty members

Personal development is planned by involving them in committees and also by examining modern scientific sources, in addition to participating in training courses inside and outside the

country in the field of scientific specialization.

Professional development of faculty members

Personal development is planned through reviewing modern scientific sources, in addition to participating in training courses inside and outside the country in the field of scientific specialization.

12. Acceptance Criterion

Central : The program follows the central admission regulations set by the ministry

13. The most important sources of information about the program

1- Student Guide for Central Admission from the Ministry of Higher Education and Scientific Research.

2- Science College Student Guide.

14. Program Development Plan

1- Development is planned by reviewing modern scientific sources in the field of scientific specialization.

2- Twining with corresponding departments in Iraqi and international universities.

3- Establishing new branches in the department.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Three	Math35118	Numerical Analysis I	(Basic)		√		√	√		√	√	√		√	√
	Math35119	Ring Theory I	(Basic)	√		√			√		√		√		√
Three	Math35120	Partial Differential Equations	(Basic)		√		√	√		√	√	√		√	
	Math35121	Mathematical Statistics I	(Basic)		√		√	√		√	√	√		√	√
Three	Math35122	Visual Basic	(Basic)	√		√			√		√		√		√
	COS3518	Mathematical Analysis II	(Basic)	√		√			√		√		√		√
Three	Math36123	Numerical Analysis II	(Basic)		√		√	√		√	√	√		√	√
	Math36124	Ring Theory II	(Basic)	√		√			√		√		√		√
Three	Math36125	Mathematical Statistics II	(Basic)	√		√			√		√		√		√
	Math36126	Algorithms	(Basic)		√		√	√		√	√	√		√	√
	Math36027	English Language II	(Basic)	√		√			√		√		√		√
	UOM3616	Topology I	(Basic)		√		√	√		√	√	√		√	√
	Math 47128	Complex Analysis I	(Basic)	√		√			√		√		√		√
	Math47129	Functional Analysis	(Basic)		√		√	√		√	√	√		√	√
	Math47130	Cryptography	(Basic)	√		√			√		√		√		√
	Math47031	Artificial Intelligence	(Basic)		√		√	√		√	√	√		√	√
	Math47132	Professional Ethics	(Basic)		√		√	√		√	√	√		√	√
	UOM4707	Topology II	(Basic)	√		√			√		√		√		√
	Math48133	Complex Analysis II	(Basic)	√		√			√		√		√		√
	Math 48134	Computer Security	(Basic)		√		√	√		√	√	√		√	√

	Math48135	Operations Research	(**Basic**)	√		√			√		√		√		√
	Math48036	Approximation Theory	(**Basic**)		√		√	√		√	√	√		√	√
	Math48137	Graduation Project	(**Basic**)	√		√			√		√		√		√

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

Module Description Form

المرحلة الرابعة

1. Course Name:
Topology I
2. Course Code:
Math 437
3. Semester / Year:
First Semester – Fourth Year
4. Description Preparation Date:
1-9-2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total):
45 hours - 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Nida Hasan Haji Email: Nida.hasan@mu.edu.iq
8. Course Objectives

Course Objectives	The student will learn the definition of a topological space and some of its properties, as well as the types of topological spaces. The student will also be able to distinguish between the algebraic and topological definitions of a set.
9. Teaching and Learning Strategies	
Learning Strategies	1- Direct instruction. 2- Brainstorming (stimulating questions). 3- Self-directed learning (preparing reports). 4- Unscheduled learning (assignments).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The Concept of Topological Spaces		Lecture and Discussion	Quiz
2	2	Basic and Subbasic		Lecture and Session	Report
3	2	Sets and Points in Topological Spaces		Practical Workshop	Report
4	2	Interior Points		Lecture and Discussion	Mid-term Exam
5	2	Terminal and Boundary Points		Lecture and Session	Report
6	2	Topology of Productivity		Lecture and Discussion	Quiz
7	2	Through Basis and Subbasic		Practical Workshop	Assignment
8	2	Continuity		Lecture and Session	Report
9	2	Open and Closed Functions		Lecture and Discussion	Quiz
10	2	Topological Equivalence		Lecture and Case Study	Assignment
11	2	Topology of Productivity		Practical Workshop	Mid-term Exam
12	2	Topology of Productivity		Lecture and Discussion	Quiz
13	2	Counting Axioms		Lecture and Discussion	Report
14	2	Counting Axioms		Lecture and Discussion	Quiz
15		Lundlöf Spaces			
11. Course Evaluation					
First month 17 Second month 17 and 7 Activity 60 Final					

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	***Theory and problems general topology by Symour L.***
Main references (sources)	مقدمه في التبولوجيا للدكتور غفار حسين Topology Second Editin by James R.
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:
Topology II
2. Course Code:
Math 441
3. Semester / Year:
Second Semester – Fourth Year
4. Description Preparation Date:
1−2−2025
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total):
45 hours - 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Nida Hasan Haji Email: Nida.hasan@mu.edu.iq
8. Course Objectives

Course Objectives	The student learns the topological properties of some spaces and how these properties are transferred from one space to another. Separation axioms, compact and connected spaces, and homotopy.
9. Teaching and Learning Strategies	
Learning Strategies	1− Direct instruction. 2− Brainstorming (stimulating questions). 3− Self−directed learning (preparing reports). 4− Unscheduled learning (assignments).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Separation Axioms		Lecture and Discussion	Quiz
2	2	T0 + T1		Lecture and Session	Report
3	2	Hausdorff Space		Practical Workshop	Report
4	2	Regular Space + T3 + T3/2		Lecture and Discussion	Mid-term Exam
5	2	Normal Space + T4		Lecture and Session	Report
6	2	Locally Compact and Compact Spaces		Lecture and Discussion	Quiz
7	2	Locally Compact and Compact Spaces		Practical Workshop	Assignment
8	2	Relationship of Compact Spaces to Hausdorff		Lecture and Session	Report
9	2	Locally Connected and Connected Spaces		Lecture and Discussion	Quiz
10	2	Countability and Its Types		Lecture and Case Study	Assignment
11	2	Central Value Theorem		Practical Workshop	Mid-term Exam
12	2	Components		Lecture and Discussion	Quiz
13	2	Trajectories		Lecture and Discussion	Report
14	2	Introduction to Homotopy		Lecture and Discussion	Quiz
15		Separation Axioms			

11. Course Evaluation
First month 17 Second month 17 and 7 Activity 60 Final

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	***Theory and problems general topology by Symour L.***

Main references (sources)	مقدمه في التبولوجيا للدكتور غفار حسين Topology Second Editin by James R.
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:
Complex Analysis I
2. Course Code:
Math 438
3. Semester / Year:
First Semester – Fourth Year
4. Description Preparation Date:
1−9−2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total):
45 hours - 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Rafid Habib Buti Email: sci.rafid@mu.edu.iq
8. Course Objectives

Course Objectives	Study of complex numbers and complex functions, study of limits and continuity and thus integration.
9. Teaching and Learning Strategies	
Learning Strategies	1− Direct instruction. 2− Brainstorming (stimulating questions). 3− Self−directed learning (preparing reports). 4− Unscheduled learning (assignments).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	real and complex numbers and geometric representation		Lecture and Discussion	Quiz
2	2	real and complex numbers and geometric representation		Lecture and Session	Report
3	2	roots form a complex plan field of complex numbers as metric space		Practical Workshop	Report
4	2	roots form a complex plan field of complex numbers as metric space		Lecture and Discussion	Mid-term Exam
5	2	complex numbers as complete space , open sets and closed sets in complex plan.		Lecture and Session	Report
6	2	complex numbers as complete space , open sets and closed sets in complex plan.		Lecture and Discussion	Quiz
7	2	Connected sets , complex functions		Practical Workshop	Assignment
8	2	Connected sets , complex functions		Lecture and Session	Report
9	2	Differential complex functions and analytic functions		Lecture and Discussion	Quiz
10	2	Differential complex functions and analytic functions		Lecture and Case Study	Assignment
11	2	Cauchy – Riemaaan equations and harmonic functions		Practical Workshop	Mid-term Exam
12	2	Cauchy – Riemaaan equations and harmonic functions		Lecture and Discussion	Quiz
13	2	complex integration		Lecture and Discussion	Report

14	2	complex integration		Lecture and Discussion	Quiz
15		Cauchy integral formula			

11. Course Evaluation	
First month 17 Second month 17 and 7 Activity 60 Final	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	- ***James Ward Brown & Raul V. Churchill, Complex Variables***
Main references (sources)	**Lars V. Alfors , Complex analysis** **John B.Conway, Functions of one complex Variable**
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:
Complex Analysis II
2. Course Code:
Math 442
3. Semester / Year:
Second Semester – Fourth Year
4. Description Preparation Date:
1−9−2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total):
45 hours - 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Amer Hamzah Ali Email: amer@mu.edu.iq
8. Course Objectives

Course Objectives	Learn about definite integrals as well as series and contour curves.
9. Teaching and Learning Strategies	
Learning Strategies	1− Direct instruction. 2− Brainstorming (stimulating questions). 3− Self−directed learning (preparing reports). 4− Unscheduled learning (assignments).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Complex Integration		Lecture and Discussion	Quiz
2	2	Contours		Lecture and Session	Report
3	2	Integral on a closed Contours		Practical Workshop	Report
4	2	Cauchy Theorem		Lecture and Discussion	Mid-term Exam
5	2	Cauchy Cursat		Lecture and Session	Report
6	2	Moreras Theorem		Lecture and Discussion	Quiz
7	2	Liouvilles Theorem and Russias Theorem		Practical Workshop	Assignment
8	2	Sequences and Series		Lecture and Session	Report
9	2	Convergent and Divergent		Lecture and Discussion	Quiz
10	2	Power Series		Lecture and Case Study	Assignment
11	2	Taylor Series		Practical Workshop	Mid-term Exam
12	2	Laurent Series		Lecture and Discussion	Quiz
13	2	Cauchy Inquality		Lecture and Discussion	Report
14	2	Poles and residues		Lecture and Discussion	Quiz
15		Types of ingular points			

11. Course Evaluation
First month 17 Second month 17 and 7 Activity 60 Final

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	شرشل ، المتغّرات العقدّية وتطبّيقاتها ، الجزء الثامن التحلّيل المركب وتطبيّقاته

Main references (sources)	اساسيات الدوال العقدية،عبدالرحمن سلمان جمعه،
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:	
Functional Analysis I	
2. Course Code:	
Math 439	
3. Semester / Year:	
First Semester – Fourth Year	
4. Description Preparation Date:	
1-9-2024	
5. Available Attendance Forms:	
In person	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 hours - 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Malik Saad Email: malik@mu.edu.iq	
8. Course Objectives	
Course Objectives	Functional analysis aims to introduce students to the concepts of: vector spaces, metric spaces, norm spaces, convergence in norm spaces, and Banach spaces.
9. Teaching and Learning Strategies	
Learning Strategies	1- Direct instruction. 2- Brainstorming (stimulating questions). 3- Self-directed learning (preparing reports). 4- Unscheduled learning (assignments).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Absorbing Sets		Lecture and Discussion	Quiz
2	2	Subspaces - Direct Addition - Norms and Dimension - Convexity		Lecture and Session	Report
3	2	Normal Spaces - Some Important Examples		Practical Workshop	Report
4	2	Spaces: Some Theorems Related to Normativity		Lecture and Discussion	Mid-term Exam
5	2	Equivalent Norms		Lecture and Session	Report
6	2	Metric Principles in Normative Spaces		Lecture and Discussion	Quiz
7	2	Convergence in Normative Spaces with Some Important Examples		Practical Workshop	Assignment
8	2	Isomorphism of Normative Spaces		Lecture and Session	Report
9	2	Multiplication of Normative Spaces		Lecture and Discussion	Quiz
10	2	Some Theorems Related to Banach Spaces		Lecture and Case Study	Assignment
11	2	Some Theorems on Partition Spaces		Practical Workshop	Mid-term Exam
12	2	Some Examples of Partition Spaces		Lecture and Discussion	Quiz
13	2	Some Theorems Related to Linear Functions and Some Examples		Lecture and Discussion	Report
14	2	Some Theorems Related to Spaces of Linear Functions and Some Examples		Lecture and Discussion	Quiz

15		Continuity - Restriction			

11. Course Evaluation
First month 17 Second month 17 and 7 Activity 60 Final

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Barbarian S. K, ," introduction to Hilbert space", 1976, New York. • Conway . j . B , "A course In functional Analysis" , 1990 , New York. • Sharma J.N andVasishtha A.R., "Introduction to functional Analysis", 1978. نوري فرحان المياحي وعلي حسين بتور " مقدمة في التحليل الدالي " جامعة القادسية , 2005 0
Main references (sources)	**1-نوري فرحان المياحي وعلي حسين بتور " مقدمة في التحليل الدالي " جامعة القادسية , 2005 0** **2- Sharma J.N andVasishtha A.R., "Introduction to functional Analysis", 1978.**
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:	
Approximation Theory	
2. Course Code:	
Math 451	
3. Semester / Year:	
Second Semester – Fourth Year	
4. Description Preparation Date:	
1-2-2025	
5. Available Attendance Forms:	
In person	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 hours - 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Malik Saad Email: malik@mu.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce students to the basic concepts of approximation theory and its important applications in numerical analysis and applied mathematics. It also aims to develop students' understanding of the algorithms and techniques used in approximation and error analysis.
9. Teaching and Learning Strategies	
Learning Strategies	1- Direct instruction. 2- Brainstorming (stimulating questions). 3- Self-directed learning (preparing reports). 4- Unscheduled learning (assignments).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Basic Concepts and Historical Review		Lecture and Discussion	Quiz
2	2	Weierstrass's Theorem, Stone's Theorem		Lecture and Session	Report
3	2	Positive Linear Operators, Korovkin's Theorem		Practical Workshop	Report
4	2	Bernstein Polynomials, Figer Sums		Lecture and Discussion	Mid-term Exam
5	2	Chebyshev's Theorem		Lecture and Session	Report
6	2	Existence and Uniqueness of the Best Approximation		Lecture and Discussion	Quiz
7	2	Best Approximation in C[a,b] Space		Practical Workshop	Assignment
8	2	Best Approximation in Lp Space		Lecture and Session	Report
9	2	Chebyshev's Polynomials		Lecture and Discussion	Quiz
10	2	Continuity Coefficient		Lecture and Case Study	Assignment
11	2	Smoothness Coefficient		Practical Workshop	Mid-term Exam
12	2	Trigonometric Approximation		Lecture and Discussion	Quiz
13	2	Blagrange Interpolation, Spline Interpolation		Lecture and Discussion	Report
14	2	B-Spline		Lecture and Discussion	Quiz
15		Orthogonal Projection Using a Spline			
11. Course Evaluation					

First month 17 Second month 17 and 7 Activity 60 Final	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Theory and problems general topology by Symour L.
Main references (sources)	
Recommended books and (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:	
Encryption	
2. Course Code:	
Math 462	
3. Semester / Year:	
First Semester – Fourth Year	
4. Description Preparation Date:	
1−9−2024	
5. Available Attendance Forms:	
In person	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 hours - 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Fahad Naim Nife Email: fahad.naim@mu.edu.iq	
8. Course Objectives	
Course Objectives	The objectives of the Cryptography course are multiple and aim to enable students to understand basic concepts and apply them to practical applications. The course also provides students with an understanding of the future of cryptography, including future threats such as quantum computing and how to address these challenges through post-quantum cryptography.
9. Teaching and Learning Strategies	
Learning Strategies	1− Direct instruction. 2− Brainstorming (stimulating questions). 3− Self−directed learning (preparing reports). 4− Unscheduled learning (assignments).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction, Cryptographic goals, Glossary, Keys and Kerckhoffs' principle,		Lecture and Discussion	Quiz
2	2	Cryptanalysis and Brute-Force Attack,		Lecture and Session	Report
3	2	Substitution techniques, Caesar's cipher		Practical Workshop	Report
4	2	Mono-Alphabetic substitution, Playfair Cipher		Lecture and Discussion	Mid-term Exam
5	2	The Vigenere (poly-alphabetic shift) cipher, transposition techniques (rotor machines)		Lecture and Session	Report
6	2	Block Ciphers and data encryption standard (DES)		Lecture and Discussion	Quiz
7	2	Modes of operation (Electronic codebook (ECB) mode, Cipher-block chaining (CBC) mode, Cipher feedback (CFB) mode, Output feedback (OFB) mode)		Practical Workshop	Assignment
8	2	Advanced Encryption Standard (AES)		Lecture and Session	Report
9	2	Public key Cryptography, Applications for Public-Key Cryptosystems(Encryption /decryption, Digital signature, Key exchange)		Lecture and Discussion	Quiz
10	2	RSA Algorithm		Lecture and Case Study	Assignment
11	2	Message authentication codes and hash functions		Practical Workshop	Mid-term Exam

12	2	Pseudorandom numbers and stream cipher (RC4)		Lecture and Discussion	Quiz
13	2	Digital Signature Schemes (RSA-signature, Shnorr Signature, DSA algorithm)		Lecture and Discussion	Report
14	2	Key Establishment, Key Freshness and Derivation		Lecture and Discussion	Quiz
15		Key Establishment Using Symmetric-Key, Key Distribution Center (KDC), Diffie–Hellman Key Exchange			

11. Course Evaluation
First month 17 Second month 17 and 7 Activity 60 Final

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Cryptography and Network Security by "William Stallings" Applied Cryptography by "Bruce Schneier"
Main references (sources)	Introduction to Modern Cryptography by "Jonathan Katz and Yehuda Lindell"
Recommended books and ref (scientific journals, reports...)	
Electronic References, Websites	-

Module Description Form

1. Course Name:

Artificial Inelegance
2. Course Code:
Math 469
3. Semester / Year:
First Semester – Fourth Year
4. Description Preparation Date:
1-9-2024
5. Available Attendance Forms:
In person
6. Number of Credit Hours (Total) / Number of Units (Total):
45 hours - 3 units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lect. Safaa Salam Email: fahad.naim@mu.edu.iq
8. Course Objectives

Course Objectives	• Define artificial intelligence and its application areas. • Understand the concept of agents and types of environments. • Explain the concept of rationality and how to apply it to agent design. • Analyze the nature of different environments and design agents appropriate for them. • Apply machine learning algorithms to solve artificial intelligence problems.
9. Teaching and Learning Strategies	
Learning Strategies	1- Direct instruction. 2- Brainstorming (stimulating questions). 3- Self-directed learning (preparing reports). 4- Unscheduled learning (assignments).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction of Artificial intelligence		Lecture and Discussion	Quiz
2	2	AI as Study and Design of Intelligent Agents		Lecture and Session	Report
3	2	AGENTS AND ENVIRONMENTS		Practical Workshop	Report
4	2	THE CONCEPT OF RATIONALITY		Lecture and Discussion	Mid-term Exam
5	2	THE NATURE OF ENVIRONMENTS		Lecture and Session	Report
6	2	First Exam		Lecture and Discussion	Quiz
7	2	THE STRUCTURE OF AGENTS -Simple reflex agents -Model based Reflex Agents		Practical Workshop	Assignment
8	2	-Goal-based Agents - Utility-based Agents		Lecture and Session	Report
9	2	- Learning Agents		Lecture and Discussion	Quiz
10	2	PROBLEM SOLVING AGENTS		Lecture and Case Study	Assignment
11	2	EXAMPLE PROBLEMS		Practical Workshop	Mid-term Exam
12	2	SEARCHING FOR SOLUTIONS		Lecture and Discussion	Quiz
13	2	UNINFORMED SEARCH STRATEGIES (Breadth first search)		Lecture and Discussion	Report
14	2	Second Exam		Lecture and Discussion	Quiz
15		-Depth-first search - A* algorithm			
11. Course Evaluation					
First month 17 Second month 17 and 7 Activity 60 Final					
12. Learning and Teaching Resources					

Required textbooks (curricular books, if any)	Artificial Intelligence: A Modern Approach (4th Edition) by Stuart Russell and Peter Norvig Artificial Intelligence: Structures and Strategies for Complex Problem Solving by George F Luger
Main references (sources)	
Recommended books and ref (scientific journals, reports...)	
Electronic References, Websites	المواقع الإلكترونية: AI Access Foundation: موقع يقدم موارد تعليمية مجانية حول الذكاء الاصطناعي. edX, Coursera, Udacity: دورات تعليمية اونلاين من جامعات عالمية في مختلف مجالات الذكاء الاصطناعي - Towards Data Science (Medium): مقالات ومدونات حول أحدث التطورات في مجال الذكاء الاصطناعي.

Module Description Form

1. Course Name:
Computer Security
2. Course Code:

Math 466	
3. Semester / Year:	
Second Semester – Fourth Year	
4. Description Preparation Date:	
1−2−2025	
5. Available Attendance Forms:	
In person	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 hours - 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Fahad Naim Nife Email: fahad.naim@mu.edu.iq	
8. Course Objectives	
Course Objectives	• Providing students with the basic concepts of protecting data and computer systems from cyber threats and attacks. • Students learn the basic principles of information security, such as data confidentiality, integrity, and availability, as well as examining potential security risks. • Analyzing various security threats, including cyber attacks such as hacking, malware, and social engineering attacks. • Modern security technologies, such as encryption systems, firewalls, and intrusion detection systems, are also reviewed.
9. Teaching and Learning Strategies	
Learning Strategies	1− Direct instruction. 2− Brainstorming (stimulating questions). 3− Self−directed learning (preparing reports). 4− Unscheduled learning (assignments).

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to Computer Security		Lecture and Discussion	Quiz
2	2	Attacks		Lecture and Session	Report
3	2	Threat, Vulnerability, and Risk		Practical Workshop	Report
4	2	Security Countermeasures		Lecture and Discussion	Mid-term Exam
5	2	Access Control Mechanisms: Authentication and Authorization		Lecture and Session	Report
6	2	Access Control Mechanisms: Types		Lecture and Discussion	Quiz
7	2	Firewalls and Network Security		Practical Workshop	Assignment
8	2	Intrusion Detection Systems (IDS)		Lecture and Session	Report
9	2	Intrusion Prevention Systems (IPS)		Lecture and Discussion	Quiz
10	2	Security Information and Event Management (SIEM) and Log Analysis		Lecture and Case Study	Assignment
11	2	Hash Functions and Integrity Protection		Practical Workshop	Mid-term Exam
12	2	Digital Signatures and Public Key Infrastructure (PKI) for Secure Communication		Lecture and Discussion	Quiz
13	2	Incident Response and Disaster Recovery Planning		Lecture and Discussion	Report
14	2	Post-Quantum Cryptography and Emerging Security Challenges		Lecture and Discussion	Quiz

15		Case Studies: Real-World Applications and Best Practices in Cryptographic Security			

11. Course Evaluation	
First month 17 Second month 17 and 7 Activity 60 Final	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Cryptography and Network Security by "William Stallings" • Applied Cryptography by "Bruce Schneier" Introduction to Modern Cryptography by "Jonathan Katz and Yehuda Lindell"
Main references (sources)	Introduction to Modern Cryptography by "Jonathan Katz and Yehuda Lindell"
Recommended books and ref (scientific journals, reports...)	
Electronic References, Websites	-