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 for the Department of Computer Networks and Software, Artificial Intelligence Branch

2026

Academic Program Description Form

University Name: Al-Furat Al-Awsat Technical University

Faculty/Institute: Najaf Technical Institute

Scientific Department: Department of Computer Networks and Software\ branch of Artificial Intelligence Techniques

Academic or Professional Program Name: Diploma of Artificial Intelligence Techniques

Final Certificate Name: Diploma

Academic System: Semester

Description Preparation Date: 15/1/2026

File Completion Date: 15/2/2026

Signature:

Head of Department Name:

Dr. Hassoon Salman Neamah

Date: 15/3/2026

Signature:

Scientific Associate Name:

Dr. Salah Mahdi Saleh

Date: 15/3/2026

Department: Director of the Quality Assurance and University Performance

Dr. Zaid Abdulkareem ALhamidawi

Date: 15/3/2026

Signature:

Approval of the Dean

Prof. Dr. Haider Hassan Abd Hussein

1. Program Vision

Building a technical education system within an applied and practical academic framework, taking into account the scientific developments and the development of information technology and artificial intelligence, relying on the quality system and the development of information reality at the national level to meet the numbers of graduates specialized in the field of information technologies and artificial intelligence at a technical level to qualify them to be able to operate and deal with smart systems, analyze data, and support the development of practical applications to be able to face the challenges of the labor market.

2. Program Mission

The Department of Computer Network and Software Technologies seeks to provide distinguished technical education in the fields of computer networks and software, artificial intelligence, and to qualify specialized cadres capable of meeting the requirements of the labor market, with the department's commitment to promoting innovation and developing technical solutions that serve the community.

3. Program Objectives

The specialization aims to graduate highly skilled technical staff that qualifies them to carry out the work of programming and operating artificial intelligence software, analyzing data, understanding the algorithms prepared for it, and how to link programs to data according to the design of appropriate rules to it, in addition to preparing security programs to operate and protect them to achieve the best service.

To achieve the vision, the following objectives must be achieved :

1. Educational Objectives:

- Providing students in the morning study with the basics of technical and practical skills that qualify them to use artificial intelligence tools, techniques and algorithms efficiently and improve their abilities towards creative thinking through the use of information technologies, data analysis, and appropriate algorithms in formulating and solving problems.
- Teach students the various specialized subjects used in the field of information technologies and artificial intelligence, identify the foundations of programming languages and databases, structure and analyze those data, and choose the appropriate models and algorithms to solve these problems and program them in advanced programming languages.
- Simplifying theoretical concepts to ensure their relevance to the level of .technical education

2. Practical Objectives:

- Training students to implement applied ideas and projects in the fields of artificial intelligence.
- Training students on various graphical analysis programs and how to find the appropriate solution to the problem.
- Training students on all safety and security requirements for software and applications and their workers, as well as data integrity and information centers affiliated with them.

4. **Program Accreditation**
Accreditation Board for Engineering and Technology (ABET)

5. **Other External Influences**
There is a close relationship with the labor market through communication with official and semi-official departments by focusing on artificial intelligence

software that is planned to be implemented in those departments, as the curriculum is updated accordingly.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
First Year (First (Semester	7	30	20%	
First Year (Second (Semester	7	30	20%	
Second Year (First (Semester	7	30	30%	
Second Year (Second Semester)	7	30	30%	

√ may include notes on whether the course is basic or elective.

7. Program Description

Year/Level	Course code	Course or course name	Credit Hours	
			theoretical	practical
First Year (First Semester)		Algorithms	2	2
		C++ programming	0	2
		Principles of Artificial Intelligence	2	2
		Computer Basics	2	2
		Math 1	2	2
		Arabic 1		
		Human Rights and Democracy	2	0
First Year (Second Semester)		Data Management	2	2
		Graphic Structures	2	2
		Algorithms 2	2	0
		++C/2 programming	2	2
		Math 2	2	2
		Advanced Artificial Intelligence	2	0
		English 1		
		Machine Learning 1	2	2

Second Year (First Semester)		Programming in Python 1	2	2
		Natural Language Processing 1	2	0
		Computer Networks	2	2
		Information and Cyber Security	2	2
		Arabic Language 2	2	0
		Project / 1	2	0
Second Year (Second Semester)		Machine Learning 2	2	2
		Programming in Python 2	2	2
		Natural Language Processing 2	2	0
		Operating Systems	2	2
		English 2	2	0
		Crimes of the Baath regime	2	2
		Project / 2	2	0

8. Expected Learning Outcomes of the Program

Knowledge

To provide students with integrated scientific knowledge in the field of computer networks and software in a high-quality manner.

The ability to apply the scientific knowledge received in the field of computers in order to ensure the achievement of knowledge communication between them and benefit from the developments of the times.

Preparing highly qualified staff specialized in the field of computer networks and software in order to effectively contribute to the establishment of a knowledge society and achieve national development goals by preparing an optimal academic environment for the development of knowledge and the acquisition of skills in research and innovation in the field of computers.

Achieving friction with the applied reality within the governmental and private state institutions by employing technologies, skills, technical tools and modern technology

Skills
The student should master the basic and advanced programming skills required to enrich their intellectual and technical output in this field of computer science and its various applications. Master the skills required to manage information systems, databases, and web design with high efficiency. The applicant must be proficient in the preparation of scientific research in a manner that takes into account an integrated scientific methodology. Possess the required professional skills in the field of software development and projects that make them confident in developing high-quality software solutions in various fields of application under various realistic constraints.

9. Teaching and Learning Strategies

Lecture Method

Laboratory education to acquire practical skills

Student Groups (Teamwork)

E-learning includes:

• Video lecturesand lectures in PDF format

• Holding electronic classes and electronic meetings to explain and discuss lectures

• Assignments and assignments for students electronically

10. Evaluation Methods

1- Oral tests to know the student's scientific background.

2- Daily tests.

3- Semester Exams (Written and Practical)

4- Comprehensive (final) exams (written and practical)

5- Electronic tests include: (Theoretical Tests، Practical Tests، Reports & Projects)

11. Faculty

Faculty Members

Academic Rank	Specialization		Special requirements/skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistant Professor	Computer Science	Computer Science			2	None
Assistant Professor	Electricity	Electricity			1	None
Teacher	Computer Science	Computer Science			1	2
Teacher	Networks & Communications	Contacts			None	1
Assistant Lecturer	Computer Science	Computer Science			2	1

Professional Development

Mentoring new faculty members

Seeking to develop, refine and master the skills necessary to be able to rise to the top through the use of abilities, qualifications and information acquired during theoretical and practical study, and this is done by:

- Continuous learning by researching new developments using the library and online resources
- Attending seminars and specialized scientific seminars.
- Participation in scientific conferences.

Faculty Professional Development

Faculty members must be within the prescribed staff, according to the ratio of students to faculty members, and competence must play a role in covering all curricula. There must also be a capacity to manage the institute adequately to accommodate the levels of interaction, student guidance, counseling, and university, professional and developmental services activities. and interact with professional practitioners as well as employers.

12. Admission Criteria

- Central admission for graduates of the preparatory study / scientific branch.
- Corresponding specialization in vocational preparations.
- Distinguished employees who hold a preparatory certificate.
- Parallel Admission

13. Key sources of information about the program

• Methodological scientific books in the field of specialization.

· Specialized practical books.

· General and specialized computer programs.

14. Program Development Plan

- Providing the possibilities of academic support in organizingscientific visits to the laboratories of state institutions.
- Providing appropriate classroom students who are able to develop their learning strategies.
- Providing information in the campus library.
- Hosting experts from outside the institute or from the work for which they are preparing to benefit from their expertise in the development of the course according to the actual need of the labor market.

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	A1	C2	C3	C4
First		Algorithms	Essential	√	√	√	√	√	√	√	√	√	√	√	√
		C++ programming	basic	√	√	√	√	√	√	√	√	√	√		
		Principles of Artificial Intelligence	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Computer Basics	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Math 1	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Arabic 1	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Human Rights and Democracy	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Data Management	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Graphic Structures	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Algorithms 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		C++/2 programming	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Math 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced Artificial Intelligence	basic	√	√	√	√	√	√	√	√	√	√	√	√
		English 1	basic	√	√	√	√	√	√	√	√	√	√		
The second		Machine Learning 1	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Programming in Python 1	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Natural Language Processing 1	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Computer Networks	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Information and Cyber Security	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Arabic Language 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Project / 1	basic	√	√	√	√	√	√	√	√	√	√		
		Machine Learning 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Programming in Python 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Natural Language Processing 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Operating Systems	basic	√	√	√	√	√	√	√	√	√	√	√	√
		English 2	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Crimes of the Baath regime	basic	√	√	√	√	√	√	√	√	√	√	√	√
		Project / 2	basic	√	√	√	√	√	√	√	√	√	√	√	√

- **Please indicate the boxes corresponding to the individual learning outcomes from the program being evaluated**

Course Description Form

1. Course Name
Algorithms
2. Course Code
3. Semester/ Year
First Semester / Second Grade
4. Description Preparation Date:
15 / **01** / **2025**
5. Available Attendance Forms:
Mandatory (theoretical and practical lectures)
6. Number of Credit Hours (Total) / Number of Units (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator's name (mention all, if more than one name)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	**Identify ways to identify the problems faced by government institutions and the private sector, and analyze them in a programmatic manner by identifying inputs, outputs, and process steps needed to reach the solution.**

9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	Basic principles of programming Program Definition Programming Languages High level language and low level language	Lecture & Discussion	Questions and Answers

			User program Application programs Operating system		
The second	4	Cognitive	Problem Solving: Understanding the problem Split the problem Problem Solving Process	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	Data types and variables used in programming languages and their definition in the program Constants & variables String & Numeric	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Flow charts Benefits of Flowcharts Shapes used in drawing flowcharts Types of Flowcharts Simple flow charts	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Branched flow charts Loop flow charts	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Algorithms Definition of the algorithm Algorithm design Types of Sequential, Conditional, and Repetition Algorithms	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Qualities of a good program Program Development Stages	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Program Writing Implementation & debugged	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Types of errors Syntax errors Run time errors Semantic errors	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Testing Documentation & maintenance	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Top-down design	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Bottom-up design	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Basic principles of programming Program Definition Programming Languages High level language and low level language User program Application programs Operating system	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Problem Solving: Understanding the problem Split the problem Problem Solving Process	Lecture & Discussion	Questions & Exercises

Fifteenth	4	Cognitive-Affective	Data types and variables used in programming languages and their definition in the program Constants & variables String & Numeric	Lecture & Discussion	Questions & Exercises

11. Course Evaluation
• Direct questions and daily exams. • Motivating students and motivating them to participate in the event. • Discussion in lectures. • Additional activities. • Semester exams and physical attendance.

12. Learning and Teaching Resources	
Required Textbooks (Methodology, if any)	
Main References (Sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name
C++ programming
2. Course Code
3. Semester/ Year
First Semester / Second Grade
4. Date this description was prepared
15 / 01 / 2025
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)

Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq	
8. Course Objectives	
Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**
9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	Abstract of programming languages What's a programming language The date and development of programming languages Levels of programming languages	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Essentials for C++ language/ C++ language concepts What's C++ program contain? What are the basic files? Simple explanation for basic files, that C++ program includes C++ language: beginning, development, its location within Levels of programming languages	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	Basic element and tools of C++ language Language symbols Definitions name Keywords Constants represent Variables represent	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Data types in C++, and the represent methods in memory Tank Type Integer type Real type Boolean (logical) type Converting between deferent data types	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive-Affective	Expression types in C++ language, how formulate expression:	Lecture & Discussion	Questions & Exercises

			Arithmetic expression /deferent arithmetic operation and its priorities / conversion manner of arithmetic expression to Arithmetic expression in C++ language/deferent examples		
Sixth	4	Cognitive-Affective	Relational expression/ relational operations and its priorities/ formulate Relational expression Logical expression/ logical operation and its priorities/ formulate Logical expression Compound expression/ priorities table of public operations/ deferent examples	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive-Affective	Give the primary values of constants and variables Spaces and brackets Type of comments Special tools	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Minim tools	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Assignment statement, its types/ with explanation examples Arithmetic expression (equation) Counters, counter types Deferent images for equations belong to C++ language	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive-Affective	Formatted Input and output functions Output text Output numeric values Output Arithmetic expression Un Formatted Input and output functions	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Control, conditional, and loop statements Cond. Statement Cond. Tools If conditional statement If… else statement Nested conditional	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive-Affective	Switch conditional statement Nested conditional statement	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Abstract of programming languages What's a programming language The date and development of programming languages Levels of programming languages	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Essentials for C++ language/ C++ language concepts What's C++ program contain?	Lecture & Discussion	Questions & Exercises

			What are the basic files? Simple explanation for basic files, that C++ program includes C++ language: beginning, development, its location within Levels of programming languages		
Fifteenth	4	Cognitive-Affective	Basic element and tools of C++ language Language symbols Definitions name Keywords Constants represent Variables represent	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	Fundamentals of Database systems 6e
Recommended books and references (scientific (…journals, reports	SQL Notes for Professionals
Electronic References, Websites	

Course Description Form

1. Course Name

Principles of Artificial Intelligence

2. Course Code

3. Semester/ Year

Quarterly / sec

4. Date this description was prepared

15 / 01 / 2025

5. Available Forms of Attendance

Mandatory (theoretical and practical lectures)

6. Number of Hours (Total) / Number of Credits (Total)

Number of Theoretical Hours (2)

Number of Practical Hours (2)
Total Hours (4)
Total Units (4)

7. Course administrator name (if more than one name mentioned)

Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq

8. Course Objectives

Course Objectives	**Providing theoretical and practical knowledge of the techniques of tasks related to planning, designing and adjusting the settings of various types of wired and wireless computer networks, detecting errors and malfunctions, and providing scientific solutions.**

9. Teaching and Learning Strategies

Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	**Introduction to Artificial Intelligence**	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	**The Importance of Data Structures in AI**	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	**Artificial Intelligence Algorithms**	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	**Machine Learning**	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	**Machine Learning**	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	**Machine Learning**	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	**Artificial neural networks**	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	**Artificial neural networks**	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	**Natural Language Processing**	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	**Natural Language Processing**	Lecture & Discussion	Questions & Exercises

Eleventh	4	Cognitive-Affective	**Computer Vision**	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	**Computer Vision**	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	**Augmented Artificial Intelligence**	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	**Augmented Artificial Intelligence**	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	**Innovations and Recent Trends in Information Security**	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name

Computer Basics

2. Course Code

3. Semester/ Year

Quarterly / sec

4. Date this description was prepared

15 / 01 / 2025

5. Available Forms of Attendance

Mandatory (theoretical and practical lectures)

6. Number of Hours (Total) / Number of Credits (Total)

Number of Theoretical Hours (2)
Number of Practical Hours (2)
Total Hours (4)
Total Units (4)

7. Course administrator name (if more than one name mentioned)

Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq

8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies

Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	**Memory type, primary storage, secondary storage.** **Computer classification, language claasification.**	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	translators program, Operation system. networking, internet. Number Systems	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	**Binary, Octal, Decimal and Hexadecimal** Conversion form Other Bases to Decimal	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	conversion from decimal to other bases	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	conversion from binary to octal and hexadecimal	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Binary-coded decimal, Digital system arithemtic, Addition and arithon	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Binary Arithmetic, Addition, Subtraction, Multiplication and Division, Representation of Negative Numbers	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	2's Complement Numbers 1's Complement Numbers	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Subtraction Using Complement	Lecture & Discussion	Questions & Exercises

Tenth	4	Cognitive	Subtraction with r's Complements Subtraction with (r – 1)'s Complement	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Logic Gates, NOT, AND and NAND, OR and NOR, XOR and XNOR	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Boolean Algebra, Boolean Variables, Boolean Expression, and Truth Table	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Basic Identities of Boolean Algebra DeMorgan's Theorem, Algebraic Manipulation, Complement of a Function, Combinational logic gate NAND& NOR, 4-bit parallal adder, Combinational logic Decoders, encoder	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Standard Forms, Sum Term and Product Term, Minterm and Maxtern	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Sum of Product and Product of Sum Combinational logic Multiplexers Combinational logic Demultiplexers, flip-flop SR	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name

Math 1

2. Course Code

3. Semester/ Year

Quarterly / sec

4. Date this description was prepared

15 / 01 / 2025

5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	
9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
The first	4	Cognitive	The concept of matrices, their types, and how to find their ranks.	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Equalization of matrices and operations on them (addition, subtraction, and multiplication)	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	The matrix determinant and its relation to its rank, the Saros method of finding the determinant value	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Inverse Matrix and its Relation to Rank, Method of Auxiliary Factors to Find the Inverse Matrix, Simultaneous Solution of Linear Equations Using the Inverse Matrix of Coefficients.	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Differential rules for algebraic, trigonological, exponential and logarithmic functions, derivative of the complex function "chain rule", implicit and partial differential derivatives.	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	The approximate true root of a nonlinear equation in a period	Lecture & Discussion	Questions & Exercises

			using the recursion method and the Newton-Ravson method.		
Seventh	4	Cognitive	the rules of integration of algebraic, trigonological, exponential and logarithmic functions,	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	the rules of integration of algebraic, trigonological, exponential and logarithmic functions,	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	The approximate true root of a nonlinear equation in a period using the recursion method and the Newton-Ravson method.	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Integral with parts and integration with partial fractions.	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Integral with parts and integration with partial fractions.	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Integral with parts and integration with partial fractions.	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	The concept of infinite sequence and sequentiality, their types, ratios, and roots to test their convergence and divergence.	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	The concept of infinite sequence and sequentiality, their types, ratios, and roots to test their convergence and divergence.	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	The concept of infinite sequence and sequentiality, their types, ratios, and roots to test their convergence and divergence.	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name
Data Management
2. Course Code
3. Semester/ Year
Quarterly / sec
4. Date this description was prepared
15 / 01 / 2025
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	Introduction to databases.	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	What is a database and what are the problems that led to the emergence of databases	Lecture & Discussion	Questions and Answers

The third	4	Cognitive-Affective	File System	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	File System	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	File System	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	What is DBMS ? Advantages of Database Management Systems	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	What is DBMS ? Advantages of Database Management Systems	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	What is DBMS ? Advantages of Database Management Systems	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	What is DBMS ? Advantages of Database Management Systems	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Data Abstraction	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Database Forms	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Relational Database	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Database Manager	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Database Manager	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Database Manager	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	Fundamentals of Database systems 6e
Recommended books and references (scientific (…journals, reports	SQL Notes For Professionals
Electronic References, Websites	

Course Description Form

1. Course Name
Data Structures
2. Course Code
3. Semester/ Year
Quarterly / sec
4. Date this description was prepared
15 / 01 / 2025
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq

8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies

Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	Definition of Graphical Structure Basic principles of the diagram structure	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Simple Data Structures Representation Method Correct Numbers	Lecture & Discussion	Questions and Answers

			Real Numbers Symbolic Strings		
The third	4	Cognitive-Affective	Arrays Representation of matrices	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Representation of monocople matrices	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Binary Array Representation	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Pointers	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Pointers	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Pointers	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Pointers	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Lists (linked list)	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Stack	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	The queue	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Charts	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Charts	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Charts	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name
Algorithms 2
2. Course Code
3. Semester/ Year
Quarterly / sec
4. Date this description was prepared
15 / **01** / **2025**
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	Process Life Cycle: Ready, Waiting, Running, Completion	Lecture & Discussion	Questions and Answers

The second	4	Cognitive	Subroutines	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	Subprograms	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Introduction to Structured Programming and its Structures	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Structured Programming Structures: Sequence, Choice (If-Then-Else)	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Do-While Installation	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Data Processing and Sorting Processes: Benefits, External Sort, Internal Sort	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Sorting Algorithms: Selection Method	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Sorting Algorithms: Bubble Sort	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Search Algorithms: Sequential Search	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Search Algorithms: Binary Search	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	File processing algorithms: File Definition, Registration, The field	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	File Types: Sequential Files, Random Files	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Module Design (Modularization): Concept and Significance	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Components and characteristics of software modules	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	

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

Course Description Form

1. Course Name
C++/2 programming
2. Course Code
3. Semester/ Year
Quarterly / sec
4. Date this description was prepared
15 / 01 / 2025
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies

Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

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

The first	4	Cognitive	Statement while	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Statement do … while	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	control at repetition statement continue statement exit statement go to	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Dimensional variables : arrays and matrices One Dimensional array	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Two Dimensional array, square array (as special state of two Dimensional array	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Symbolic array, and represent string type	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Functions Global and local variable Define function Call function Ways of calling functions	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Form of retrieving values from function Parameters arguments Factors effecting at using functions	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Functions of type void User defined functions	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Library of standards functions String functions Arithmetic functions Date and time functions	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Graphics and screen Colors functions Draw pixels functions Draw lines functions Draw rectangle functions Draw circle functions Draw pattern functions Types of screens	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Graphics and screen Colors functions Draw pixels functions Draw lines functions Draw rectangle functions Draw circle functions Draw pattern functions Types of screens	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Graphics and screen Colors functions Draw pixels functions Draw lines functions	Lecture & Discussion	Questions & Exercises

			Draw rectangle functions Draw circle functions Draw pattern functions Types of screens		
Fourteenth	4	Cognitive-Affective	Build workable integral system, include arrays and above mentioned functions	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Build workable integral system, include arrays and above mentioned functions	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	Fundamentals of Database systems 6e
Recommended books and references (scientific (…journals, reports	SQL Notes For Professionals
Electronic References, Websites	

Course Description Form

1. Course Name
Math 2
2. Course Code
3. Semester/ Year
Quarterly / sec
4. Date this description was prepared
15 / **01** / **2025**
5. Available Forms of Attendance
Mandatory (theoretical and practical lectures)
6. Number of Hours (Total) / Number of Credits (Total)
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)
7. Course administrator name (if more than one name mentioned)
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq
8. Course Objectives

Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**

9. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	4	Cognitive	MATLAB Application , Application Operating Method and its Most Important Windows, Work in Command Window	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Operations on matrices	Lecture & Discussion	Questions and Answers

The third	4	Cognitive-Affective	Operations on matrices	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Application for the inverse of the matrix / ways to find it	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive	Examples of Solving Linear Equations Using Matrix Inverse/Multiplication of Matrices	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Examples of Solving Linear Equations Using Matrix Inverse/Multiplication of Matrices	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Application of Linear and Trigonometric Functions and Their Derivatives	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Application of Linear and Trigonometric Functions and Their Derivatives	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Application of Exponential and Logarithmic Functions and Their Derivatives	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Application of Exponential and Logarithmic Functions and Their Derivatives	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Exercises on the topic of partial calculus/implicit differentiation	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Numerical Differential Examples / Trapezoidal Method	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Exercises on Ordinary Differential Equations of the First Order	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Application of Types and Methods of Solving Differential Equations (Separation of Variables, Homogeneous)	Lecture & Discussion	Questions & Exercises
Fifteenth	4	Cognitive-Affective	Examples of Perfect and Linear Differential Equations	Lecture & Discussion	Questions & Exercises

11. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

12. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	Fundamentals of Database systems 6e

Recommended books and references (scientific (…journals, reports	SQL Notes for Professionals
Electronic References, Websites	

Course Description Form

13. Course Name	
Advanced Artificial Intelligence	
14. Course Code	
15. Semester/ Year	
Quarterly / sec	
16. Date this description was prepared	
15 / 01 / 2025	
17.Available Forms of Attendance	
Mandatory (theoretical and practical lectures)	
18.Number of Hours (Total) / Number of Credits (Total)	
Number of Theoretical Hours (2) Number of Practical Hours (2) Total Hours (4) Total Units (4)	
19. Course administrator name (if more than one name mentioned)	
Name: Eng. Eng. Safaa Mohsen Karim Email: safaa.kareem@atu.edu.iq	
20. Course Objectives	
Course Objectives	**Introduce the student to the most important theoretical and applied concepts of databases and their terminology.** **Dealing with and programming databases in SQL Server**
21. Teaching and Learning Strategies	
Strategy	Lecture Method Laboratory education to acquire practical skills Student Groups (Teamwork) Assignments - Assignments for Students

22. Course Structure

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

The first	4	Cognitive-Affective	Advanced programming basics of the Python programming language and use the AI libraries provided by the Python programming language such as NumPy and Pandas to handle data. scikit-Learn to apply machine learning, TensorFlow, andPyTorch algorithms to build and train models for deep learning and neural network training.	Lecture & Discussion	Questions and Answers
The second	4	Cognitive	Some applications for graphic structures, including charts	Lecture & Discussion	Questions and Answers
The third	4	Cognitive-Affective	Search charts using AI algorithms	Lecture & Discussion	Questions & Exercises
Fourth	4	Cognitive-Affective	Creating Maze Puzzles with Python	Lecture & Discussion	Questions & Exercises
Fifth	4	Cognitive-Affective	Image Processing	Lecture & Discussion	Questions & Exercises
Sixth	4	Cognitive-Affective	Image Processing	Lecture & Discussion	Questions & Exercises
Seventh	4	Cognitive	Building Machine Learning Models	Lecture & Discussion	Questions & Exercises
Eighth	4	Cognitive-Affective	Classification: Applying algorithms such as SVM, Decision Trees, and Random Forest to classify data.	Lecture & Discussion	Questions & Exercises
Ninth	4	Cognitive-Affective	Regression: Building models such as Linear Regression and Polynomial Regression to predict continuous values.	Lecture & Discussion	Questions & Exercises
Tenth	4	Cognitive	Deep Learning: Neural Networks: Design and training of basic neural networks.	Lecture & Discussion	Questions & Exercises
Eleventh	4	Cognitive-Affective	Convolutional Neural Networks: Used in image processing. Recurrent Neural Networks: Manipulating serial data such as text and temporal data.	Lecture & Discussion	Questions & Exercises
XII	4	Cognitive	Reinforcement Learning: Environment design: How to create an environment for reinforcement learning.	Lecture & Discussion	Questions & Exercises
Thirteenth	4	Cognitive-Affective	Reinforcement Learning Algorithms: Use algorithms such as Q-Learning and Deep Q-Networks to train agents to make decisions.	Lecture & Discussion	Questions & Exercises
Fourteenth	4	Cognitive-Affective	Practical AI Applications: Artificial Intelligence in Healthcare: Applications such as disease diagnosis and medical image analysis.	Lecture & Discussion	Questions & Exercises

Fifteenth	4	Cognitive-Affective	Artificial Intelligence in Business: The use of AI to analyze business data and improve processes.	Lecture & Discussion	Questions & Exercises

23. Course Evaluation

- Direct questions and daily exams.
- Motivating students and motivating them to participate in the event.
- Discussion in lectures.
- Additional activities.
- Semester exams and physical attendance.

24. Learning and Teaching Resources

Required Textbooks (Methodology, if any)	
Main References (Sources)	Fundamentals of Database systems 6e
Recommended books and references (scientific (…journals, reports	SQL Notes for Professionals
Electronic References, Websites	