



Course Specification

DIPLOMA

Course Title: **Discrete Structures**

Course Code: **APDA1201**

Program: **Diploma in Data Analytics**

Department: **Diploma Department**

College: **The Applied College**

Institution: **Umm Al-Qura University**

Version: **1**

Last Revision Date: **05 May 2025**



Table of Contents

A. General information about the course:	3
B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods	4
C. Course Content.....	6
D. Students Assessment Activities	6
E. Learning Resources and Facilities.....	6
F. Assessment of Course Quality	7
G. Specification Approval	8





A. General information about the course:

1. Course Identification

1. Credit hours:				
2				
2. Course type				
A.	<input type="checkbox"/> University	<input type="checkbox"/> College	<input checked="" type="checkbox"/> Department	<input type="checkbox"/> Track
B.	<input checked="" type="checkbox"/> Required		<input type="checkbox"/> Elective	
3. Level/year at which this course is offered: Level 2, 1st Year				
4. Course General Description:				
This course introduces the essential mathematical concepts used in data science, focusing on logic, set theory, combinatorics, graph theory, and discrete probability. The course emphasizes practical applications in data science, machine learning, and algorithms. Students are prepared to apply discrete mathematics in real-world data science scenarios.				
5. Pre-requirements for this course (if any):				
None				
6. Co-requisites for this course (if any):				
None				
7. Course Main Objective(s):				
<ol style="list-style-type: none"> 1) Build essential discrete mathematics concepts to support data science applications. 2) Develop analytical problem-solving skills to solve complex problems using discrete structures and reasoning techniques. 3) Explore data manipulation and relationships to model and analyze data relationships effectively. 4) Apply logic and algorithmic thinking design and analyze efficient data science workflows. 				

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	None	
3	Hybrid	None	



No	Mode of Instruction	Contact Hours	Percentage
	<ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning	None	

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	None
3.	Field	None
4.	Tutorial	None
5.	Others (specify)	None
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Explain the fundamental concepts of discrete mathematics, including logic, set theory, combinatorics, graph theory, and discrete probability.	K1	Presentations, Discussion	Exams, Assignments
1.2	Describe the relationships between discrete structures and their applications in data science, including algorithm design and data representation.	K2	Brainstorming, Presentations	Exams, Assignments
1.3	Understand the role of recurrence relations in	K3	Presentations, Discussion	Exams, Assignments

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	analyzing the efficiency of algorithms.			
2.0	Skills			
2.1	Solve problems using logic, reasoning, and combinatorics.	S1	Presentations, Practical Training, Self-learning, Group Activity	Exams, Assignments, Project
2.2	Model and analyze data using set theory, relations, and functions.	S2	Presentations, Practical Training, Self-learning, Group Activity	Exams, Assignments, Project
2.3	Utilize discrete probability to manage uncertainty and make predictions	S3	Presentations, Practical Training, Self-learning, Group Activity	Exams, Assignments, Project
2.4	Apply and use discrete mathematical concepts to model, reason and optimize and solve data-driven problems	S4	Presentations, Practical Training, Self-learning, Group Activity	Exams, Assignments, Project
3.0	Values, autonomy, and responsibility			
3.1	Appreciate the value of data-informed decision-making.	V1	Lectures	Project
3.2	Recognize the importance of logic and reasoning in ethical decision-making	V2	Lectures	Project
3.3	Collaborate with peers to explore and solve real-world problems.	V3	Lectures	Project





C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Discrete Structures	2
2.	Logic	2
3.	Proof	2
4.	Sets and Set Operations	2
5.	Relations	2
6.	Functions	2
7.	Combinatorics	2
8.	Sequence and Summation	2
9.	Graph Theory	2
10.	Trees	2
11.	Boolean Algebra	2
12.	Recurrence Relations	2
13.	Discrete Probability	2
14.	Applications for Discrete Structures	2
15.	Review and wrap up	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Week 3,12	10%
2.	Assignments	10	20%
3.	Midterm Exam	Week 7	20%
4.	Project	Continuous	10%
5.	Final Exam	Week 16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	
	Rosen, K. H. (2021). Discrete Mathematics and Its Applications. India: McGraw Hill Education (India) Private Limited.



Supportive References	Lehman, E., Leighton, F. T., Meyer, A. R. (2017). Mathematics for Computer Science. Hong Kong: Samurai Media Limited.
Electronic Materials	Lecture slides, Videos
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show projector Collab
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect Course survey and students' feedback.
Effectiveness of Students	Faculty Members, Peer Reviewers	Direct Report on the satisfaction of exam standards.
Quality of learning resources	Faculty Member, Course Coordinators	Direct Learning resources evaluation survey.
The extent to which CLOs have been achieved	Faculty Members, Program Leaders	Direct Course reports.
Other		





Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851281214463/193664
DATE	1447/01/20

