



# Course Specification

## **DIPLOMA**

Course Title: **Data Visualization**

Course Code: **APDA3212**

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**

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## A. General information about the course:

### 1. Course Identification

1. Credit hours: ( 3 )

#### 2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others  
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: ( Level 3/ Year 2 )

#### 4. Course General Description:

This course introduces the principles and practices of data visualization, with a strong emphasis on its role within data science and analytics. It focuses on visual communication of data to support decision making, derive actionable insights, and explore data patterns effectively. Students will learn how to explore, interpret, present and communicate various types of data. Using effective visual design. Topics include perception and cognition, data types, visual encoding, visual variables, chart types, color theory, and interactive dashboards. Students will use modern tools and libraries to build compelling data visualizations that facilitate analytical reasoning and storytelling with data.

#### 5. Pre-requirements for this course (if any):

APDA2209- Applications in Data Analytics

#### 6. Co-requisites for this course (if any):

N/A

#### 7. Course Main Objective(s):

The course main objectives are:

- Understand core theoretical foundations of data visualization.
- Select appropriate visual encodings for different data types and audience needs.
- Apply ethical principles in data presentation and accessibility.
- Create clear, meaningful, and interactive data visualizations.





- Critique and improve visualizations based on design principles and user feedback.

## 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		
4	Distance learning		

## 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	
5.	Others (specify)	
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 principles of data visualization including visual perception, data	K1	Lectures Guided discussions/reading	Quizzes Exams



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	types, and encoding techniques.			
1.2	Identify appropriate visualization types based on data characteristics and audience needs.	K2	Lectures Case studies Discussions	Quizzes Exams Assignments
<b>2.0</b>	<b>Skills</b>			
2.1	Use appropriate tools to create static and interactive data visualizations for real-world datasets.	S2	Labs	Lab exercises Project
2.2	Evaluate and improve visualizations based on clarity, effectiveness, and ethical presentation.	S3	Peer review sessions Hands-on redesign activities	Quizzes Exams Lab exercises
2.3	Design dashboards that support decision-making and communicate analytical insights.	S4	Labs	Lab exercises Project
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Demonstrate ethical responsibility in data representation, accessibility, and communication.	V1	Discussions Case Studies	Project Lab exercises
3.2	Collaborate effectively in teams to plan, design, and critique visual data products.	V2	Group Discussion Team assignments	Project Lab exercises

### C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Data Visualization and its Importance in Data Analytics	4





2.	Human Perception and Visual Encoding Principles	4
3.	Data Types and Encoding Strategies	4
4.	Visual Variables and Matching Charts to Data Types	4
5.	Color Theory and Design for Accessibility	4
6.	Principles of Dashboard Design	4
7.	Interactive Visualizations and User Engagement	4
8.	Midterm Exam and Lab review	4
9.	Time Series, Distributions, and Categorical Data Visualization	4
10.	Multivariate and Hierarchical Data Visualization	4
11.	Maps and Geographic Data Visualization	4
12.	Storytelling with Data	4
13.	Project Work: Dashboard/Visualization Design and Prototyping	4
14.	Ethical Issues in Data Visualization and Peer Review	4
15.	Final Project Presentations and Course Wrap-up	4
Total		60

#### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Week 4, 12	10%
2.	Midterm Exam	Week 8	20%
3.	Lab Assessment	Week 2-11	15%
4.	Project	Week 6-14	15%
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	Munzner, T. (2021). <i>Visualization Analysis and Design</i> . A K Peters/CRC Press.
	Wilke, Claus O. (2019). <i>Fundamentals of Data Visualization</i> . O'Reilly Media, Inc.
Supportive References	Cairo, A. (2016). <i>The Truthful Art: Data, Charts, and Maps for Communication</i> . New Riders





	Knaflig, C. N. (2015). <i>Storytelling with Data: A Data Visualization Guide for Business Professionals</i> . Wiley.
Electronic Materials	Official Tableau tutorials – <a href="https://www.Tableau.com/learn">https://www.Tableau.com/learn</a> Saudi Open Government Data- <a href="https://data.gov.sa">https://data.gov.sa</a> Practice datasets and community resources- <a href="https://www.kaggle.com">https://www.kaggle.com</a> YouTube educational channels (e.g., StatQuest, FlowingData)
Other Learning Materials	Instructor-provided lecture slides and lab exercises on Blackboard.

## 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture classrooms with seating and display capabilities. Computer Labs equipped with student workstations and internet access.
<b>Technology equipment</b> (projector, smart board, software)	Projector, instructor PC with internet access. Software: Tableau Public, Microsoft Excel, Power BI.
<b>Other equipment</b> (depending on the nature of the specialty)	

## F. Assessment of Course Quality

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

