



# Course Specification

## DIPLOMA

Course Title: **Introduction to Data Science**

Course Code: **APDA1205**

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 1/ Year 1 )

#### 4. Course General Description:

This course introduces students to the field of Data Science and its core components, including data collection, preparation, analysis, and interpretation. It emphasizes the distinction between data science and data engineering lifecycles, introduces common tools, platforms, and applications, and explores ethical and strategic considerations in the use of data. Through guided activities, students will develop foundational skills in identifying data problems, formulating analytical questions, and proposing basic approaches for data analysis.

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

None

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

None

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

The course main objectives are to:

- Understand the fundamentals and significance of data science in today's data-driven world.
- Explore the data science lifecycle and compare it with data engineering.
- Identify key data sources, types, and collection approaches used in analytical contexts.
- Recognize ethical and legal implications, including privacy and bias in data usage.





- Develop introductory-level skills in framing data-related problems and proposing analytical strategies.

## 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          | 60            |
| 2.    | Laboratory/Studio |               |
| 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 concept and importance of data science and its key components. | K1                                    | Lectures<br>Class discussion | Quizzes<br>Exams   |
| 1.2  | Describe the data science lifecycle and distinguish it from                | K2                                    | Lectures<br>Group Discussion | Quizzes<br>Exams   |





| Code       | Course Learning Outcomes   | Code of PLOs aligned with the program | Teaching Strategies  | Assessment Methods    |
|------------|--|---------------------------------------|--|-----------------------|
|            | the data engineering process.  |                                       |  |                       |
| 1.3        | Identify key ethical considerations in data science including privacy, bias, and social impact.          | K3                                    | Lectures<br>Class Discussion with examples                                   | Quizzes<br>Exams      |
| <b>2.0</b> | <b>Skills</b>  |                                       |  |                       |
| 2.1        | Define data-related problems and formulate relevant analytical questions.                                | S4                                    | Brainstorming sessions<br>Project ideation                                   | Assignment            |
| 2.2        | Identify appropriate data types, sources, and collection methods to support analysis.                    | S2                                    | Example walkthroughs   | Assignment            |
| 2.3        | Propose a basic approach for organizing, preparing, and interpreting data to support insight generation. | S4                                    | Example walkthroughs<br>Class discussion                                     | Assignment            |
| <b>3.0</b> | <b>Values, autonomy, and responsibility</b>  |                                       |  |                       |
| 3.1        | Demonstrate awareness of ethical responsibility in handling and interpreting data.                       | V1                                    | Class ethical scenario discussion<br>Instructor reflections<br>Peer feedback | Team-based assignment |
| 3.2        | Collaborate effectively with peers in performing data-related tasks.                                     | V2                                    | Team-based assignment<br>Group brainstorming<br>Peer review exercises        | Team-based assignment |



## C. Course Content

| No    | List of Topics   | Contact Hours |
|-------|--|---------------|
| 1.    | Introduction to Data Science: Definitions, Scope, and Impact             | 3             |
| 2.    | Roles in the data domain: Data Scientist, Analyst, Engineer              | 3             |
| 3.    | The Data Science Lifecycle vs. Data Engineering Lifecycle                | 3             |
| 4.    | Framing problem statements and asking analytical questions               | 3             |
| 5.    | Data types, data sources, and data collection approaches                 | 3             |
| 6.    | Data quality concepts, missing data, and basic cleaning principles       | 3             |
| 7.    | Ethical and legal issues in data science: bias, privacy, impact.         | 3             |
| 8.    | Midterm and guided project reflection                                    | 3             |
| 9.    | Tools and platforms for data science (overview- conceptual)              | 3             |
| 10.   | Introduction to exploratory data analysis and identifying basic patterns | 3             |
| 11.   | Storytelling with data and communicating insights effectively            | 3             |
| 12.   | Designing solution approaches: matching data and questions               | 3             |
| 13.   | Project scoping and development  | 3             |
| 14.   | Peer review and final project refinement                                 | 3             |
| 15.   | Final project presentation and course reflection                         | 3             |
| Total |  | 45            |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|-------------------------|--------------------------------|--------------------------------------|
| 1. | Quizzes                 | 4-12                           | 15%                                  |
| 2. | Midterm Exam            | 8                              | 25%                                  |
| 3. | Project                 | 4-15                           | 20%                                  |
| 4. | Final Exam              | 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  | Wagh, S. J., Bhende, M. S., & Thakare, A. D. (2021). <i>Fundamentals of Data Science</i> (1st ed.). Chapman and Hall/CRC. ISBN: 9781138336186. |
| Supportive References | Reis, J., & Housley, M. (2022). <i>Fundamentals of Data Engineering</i> (1st ed.). O'Reilly Media. ISBN: 9781098108304                         |
| Electronic Materials  | Online tutorials and datasets from platforms like:   |





|                          |  |
|--------------------------|--|
|                          | <p>Saudi Open Data Portal- <a href="https://data.gov.sa">https://data.gov.sa</a></p> <p>Kaggle- <a href="https://www.kaggle.com">https://www.kaggle.com</a></p> <p>DataCamp (conceptual lessons and short exercises)<br/><a href="https://www.datacamp.com">https://www.datacamp.com</a></p> |
| Other Learning Materials | <ul style="list-style-type: none"> <li>• Sample data and case studies for group discussion/work.</li> <li>• Videos and interviews with industry professionals curated from platforms like YouTube and Coursera.</li> <li>• University LMS</li> </ul>   |

## 2. Required Facilities and equipment

| Items   | Resources   |
|---|---|
| <b>facilities</b><br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | Lecture classrooms with seating and whiteboard.<br>Spaces for collaborative activities and project discussions. |
| <b>Technology equipment</b><br>(projector, smart board, software)                         | Projector and instructor computer with internet access.<br>Student access to university LMS.                    |
| <b>Other equipment</b><br>(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><br>Course survey and students' feedback.       |
| Effectiveness of Students                   | Faculty Members, Peer Reviewers     | <b>Direct</b><br>Report on the satisfaction of exam standards. |
| Quality of learning resources               | Faculty Member, Course Coordinators | <b>Direct</b><br>Learning resources evaluation survey.         |
| The extent to which CLOs have been achieved | Faculty Members, Program Leaders    | <b>Direct</b><br>Course reports.                               |





| Assessment Areas/Issues | Assessor | Assessment Methods |
|-------------------------|----------|--------------------|
| 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                     |

