



Course Specification

(Bachelor)

Course Title: Fundamentals of Machine Learning and Big Data

Course Code: APFT2512

Program: Financial Technology

Department: Diploma

College: Applied College

Institution: Umm Al-Qura University

Version: 1

Last Revision Date: 2025



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A. General information about the course:

1. Course Identification

1. Credit hours: (4 hours)

2. Course type

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

3. Level/year at which this course is offered: (1st level –1st year)

4. Course General Description

This course will provide:

- Introduction of using programming language with artificial intelligence methods.
- Basics of data science, machine learning, and big data techniques.

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

Programming Fundamentals

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

N.A.

7. Course Main Objective(s):

The main objective of this course is to provide students with an overview of utilizing programming concepts with big data and machine learning methods.

2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|--|---------------|------------|
| 1 | Traditional classroom | 5 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning | | |
| 4 | Distance learning | | |



3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|-------|-------------------|---------------|
| 1. | Lectures | 3 * 15 = 45 |
| 2. | Laboratory/Studio | 2 * 15 = 30 |
| 3. | Field | |
| 4. | Tutorial | |
| 5. | Others (specify) | |
| Total | | 75 |

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 | Recall programming concepts. | K1 | <ul style="list-style-type: none">▪ Lectures▪ Lab demonstrations | <ul style="list-style-type: none">▪ Written exam▪ Homework assignments▪ Lab assignments▪ Class Activities▪ Quizzes |
| 1.2 | Recognize different data science, big data, and machine learning methods. | K1, K3 | | |
| 2.0 | Skills | | | |
| 2.1 | Apply computer science theory and AI fundamentals to produce basic software solutions. | S1 | <ul style="list-style-type: none">▪ Lectures.▪ Lab projects.▪ Case studies▪ Individual presentations.▪ Brainstorming | <ul style="list-style-type: none">▪ Written exam▪ Homework assignments▪ Lab assignments.▪ Class Activities▪ Quizzes▪ Practical Exam. |
| 2.2 | Design and code software solutions using programming language concepts, data science, big data and machine learning techniques. | S3 | | |
| 3.0 | Values, autonomy, and responsibility | | | |
| 3.1 | Manage self-learning by collecting and classifying information on a specific topic. | V3 | <ul style="list-style-type: none">▪ Small group discussions.▪ Whole group discussions.▪ Brainstorming.▪ Presentations.▪ Case study. | <ul style="list-style-type: none">▪ Practical Exam.▪ Lab assignments.▪ Class Activities.▪ Quizzes. |
| 3.2 | Demonstrate commitment to academic values, standards, and ethical code | V1 | | |



| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|------|--|---------------------------------------|---------------------|--------------------|
| | of conduct, and represent responsible citizenship. | | | |
| 3.3 | Work in groups | V2 | Labs | ▪ Group Project |

C. Course Content

| No | List of Topics | Contact Hours | |
|-------|---|---------------|-----------|
| | | Theoretical | Practical |
| 1. | Intro to Data Science, Big Data, and Machine Learning | 3 | 2 |
| 2. | AI programming language and Libraries | 6 | 4 |
| 3. | CSV/Datasets Files | 3 | 2 |
| 4. | Data Science Basics | 6 | 4 |
| 8. | Machine Learning (ML) Types and Algorithms | 6 | 4 |
| 9. | Applying Machine Learning Algorithms (Classification) | 9 | 6 |
| 6. | Big Data Basics | 6 | 4 |
| 7. | Working with Big Data | 6 | 4 |
| Total | | 45 | 30 |

D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|-------------------------|--------------------------------|--------------------------------------|
| 1. | Quizzes & Assignments | Throughout the term | 5 % |
| 2. | Midterm Exam | 8 | 20 % |
| 3. | Practical skills | Throughout the term | 25 % |
| 4. | Group Project | Throughout the term | 10% |
| 4. | Final Exam | Final Weeks | 40% Theoretical Exam |

*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 | <ol style="list-style-type: none"> 1- Intro to Python for Computer Science and Data Science : Learning to Program with AI, Big Data and The Cloud, 2021 2- Y. Hilpisch, <i>Python for Finance: Data Analysis, Financial Modeling, and Portfolio Management</i>, 3rd ed. Sebastopol, CA: O'Reilly Media, 2024. |
|----------------------|---|



| | |
|---------------------------------|--|
| Supportive References | Course notes on the E-learning web-site |
| Electronic Materials | |
| Other Learning Materials | Instructor handouts and presentation in ppt. |

2. Required Facilities and equipment

| Items | Resources |
|---|--|
| facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | <ul style="list-style-type: none"> Classroom well equipped with at least 40 adequate seats. Laboratory well equipped with at least 20 adequate seats. Internet connection |
| Technology equipment (projector, smart board, software) | <ul style="list-style-type: none"> Smart board Data show IDE software for Programming language |
| Other equipment (depending on the nature of the specialty) | <ul style="list-style-type: none"> Internet inside the classroom. Library: Up to date scientific books, in the library. |

F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|--|--|
| Effectiveness of teaching | Students | Questionnaire of course quality |
| Effectiveness of Students assessment | Peer reviewers | -Random grading report -Test Completion report for test standards |
| Quality of learning resources | Students | E-Survey of sufficiency of learning resource |
| The extent to which CLOs have been achieved | Instructor, program leaders and Course coordinator | Questionnaire of course quality |
| 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. | 851281214463/194460 |
| DATE | 1447/01/20 |

