Course Specification

(Bachelor)

Course Title:	Big Data Analytics
Course Code:	SE4708
Program:	BSc in Software Engineering
Department:	Software Engineering
College:	College of Computing
Institution:	Umm Al Qura University
Version:	1.0
Last Revision Date:	22/04/2025

Table of Contents

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: (3rd year/ 5th or 6th level) or (4th year/8th level)					
4. Course General Description:					
This course explores the fundamental principles and advanced practices in big data analytics, equipping students with the skills to analyze, process, and extract meaningful insights from large and complex datasets. Students will gain hands-on experience with big data tools and technologies such as Hadoop, Spark, and Kafka, alongside learning data visualization and machine learning techniques. The course emphasizes practical applications and real-world problem-solving in diverse domains like business itelligence, social media, and IoT.					
5. Pre-requirements for this course (if any)**:**					
DS2201 - Introduction to Database					
6. Co-requisites for this course (if any):					
N/A					
7. Course Main Objective(s):					
By the end of the course, students will: 1. Understand the architecture and components of big data frameworks like Hadoop, Spark, Kafka, and Flink. 2. Build and manage scalable data pipelines for batch and real-time processing. 3. Apply machine learning techniques to analyze big data and generate actionable insights. 4. Utilize cloud-based big data tools and services for efficient data storage and processing. 5. Implement data governance and security strategies to ensure compliance and protect data assets. **6.** Optimize the performance of big data applications for real-world use cases in business, social media, and IoT.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		45

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	Understand the key concepts, architecture, and ecosystem of big data technologies.	K1	Lectures, Group Discussions	Quizzes, Exams
1.2	Explore machine learning techniques applied to big data analytics.	K2	Lectures, Group Discussions	Quizzes, Exams
2.0	**Skills**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.1	Design and implement big data processing pipelines using frameworks like Hadoop and Spark.	S1	Lectures, Group Discussions	Quizzes, Exams
2.2	Utilize machine learning libraries for predictive analytics on big data.	S2	Lectures, Group Discussions	Quizzes, Exams
2.3	Develop interactive dashboards and visualizations using tools such as Tableau or Power BI.	S4	Lectures, Group Discussions	Quizzes, Exams
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectivily in a interdisceplenary team to ahcieve the plans and goals	V2	Lectures, Group Discussions	Quizzes, Exams

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Big Data Analytics	3
2.	Introduction to Hadoop and its components	3
3.	HDFS and other distributed storage systems (Amazon S3, Google Cloud Storage).	6
4.	Data Ingestion and ETL	3
5.	Batch Processing with Hadoop	3
6.	Real-Time Processing with Kafka and Flink	3
7.	Big Data Frameworks: Spark	3
8.	Machine Learning on Big Data	3
9.	Big Data Visualization	3
10.	Data Governance and Security	3

11.	Introduction to AWS, Azure, and Google Cloud big data services	3
12.	Case studies: business intelligence, social media analytics, IoT data processing.	3
13.	Emerging Trends in Big Data Analytics	3
14.	Performance Optimization	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	2-14	15
2.	Projects	2-14	15
3.	Assignments	2-14	10
4.	Mid Term	7	20
5.	Final Exam	16-17	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	• Acharya, S., & Chellappan, S. (2020). *Big data and analytics* (2nd ed.). Wiley India Pvt. Ltd. ISBN 978-8126579518.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Traditional Classroom
Technology equipment (projector, smart board, software)	Multimedia Projector
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct, Indirect
Effectiveness of Students assessment	Faculty, Peer reviewer	Direct, Indirect
Quality of learning resources	Faculty, Course coordinator	Direct, Indirect
The extent to which CLOs have been achieved	Course coordinator, Program management committee	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**SOFTWARE ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**THE 17TH MEETING FOR THE ACADEMIC YEAR 1446H**
DATE	**22/04/2025**