NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	BTech CSE
Course Code:	4CS205ME25
Course Title:	Analytics of IoT
Course Type:	Department Elective IV
Year of Introduction:	2025-26

L	T	Practical Component				C
		LPW	PW	W	S	
3	0	2	-	-	-	4

Course Learning Outcomes (CLO):

At the end of the course, the students will be able to –
1. summarise the architectural components and platforms of the IoT ecosystem (BL2)
2. apply appropriate access technology and protocols as per the application requirement (BL3)
3. analyse the role of big data, cloud computing, and data analytics in a typical IoT system (BL4)
4. design applications with suitable lightweight data processing and communication methodologies. (BL6)

Unit	Contents	Teaching hours
Unit-I	**Introduction to IoT:** importance and applications, IoT architectures, introduction to analytics, IoT analytics challenges	05
Unit-II	**Primitives of IoT:** IoT devices, Networking basics, IoT connectivity protocols, IoT networking, and data messaging protocols, analyzing data to infer protocol and device characteristics	10
Unit-III	**IoT Analytics for the Cloud:** Introduction to elastic analytics, Cloud security and analytics, designing data processing for analytics, Applying big data technology to storage	09
Unit-IV	**Exploring IoT Data:** Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis	07
Unit-V	**Data Science for IoT Analytics:** Introduction to Machine Learning, Feature engineering with IoT data, Validation methods, Understanding the bias-variance trade-off, Use cases for deep learning with IoT data	09
Unit-VI	**Strategies to Organize Data for Analytics:** Linked Analytical Datasets, Managing data lakes, data retention strategy	05

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings/ References:

1. Minteer, Andrew. *Analytics for the Internet of Things (IoT)*. Packt Publishing Ltd
2. Kai Hwang, Min Chen, *Big-Data Analytics for Cloud*, IoT and Cognitive Computing, Wiley

3. Colin Dow, *Hands-On Edge Analytics with Azure IoT: Design and develop IoT applications with edge analytical solutions including Azure IoT Edge*, Packt Publishing Ltd
4. Hwaiyu Geng, *Internet of Things and Data Analytics Handbook*, Wiley
5. John Soldatos, *Building Blocks for IoT Analytics Internet-of-Things Analytics*, River Publishers
6. Gerardus Blokdyk, *IoT Analytics A Complete Guide*, 5starcooks

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	Programming the IoT boards: ESP8266/ESP32/Arduino with IDE	02
2	IoT Applications Development with Cisco Packet Tracer	02
3	IoT Sensor and Actuator integration with ESP32/ESP8266 with WiFi and HTTP	02
4	Implementing REST API Server for IoT devices	02
5	Publish and Subscribe with MQTT Client and MQTT Broker using RPi/ESP8266/ESP32	04
6	IoT Application with NodeRed: MQTT, MongoDB, HTTP REST client and server	04
7	IoT Application Development with NodeRed: Designing Dashboard for IoT Data	04
8	Designing IoT Analytics Pipeline on Cloud Platform and Data Visualization	04
9	Analysing and Processing IoT Data with ML approaches	02
10	Deploying the inference models on Edge Computing devices	04