NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	MTech CSE (Data Science)
Course Code:	6CS471ME25
Course Title:	IoT and Edge Analytics
Course Type:	Department Elective-II
Year of Introduction:	2025-26

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Course Learning Outcomes (CLO):

At the end of the course, the students will be able to:

1. explain the architectural components and platforms of the IoT ecosystem (BL2)
2. apply appropriate access technology and protocols as per the application requirement (BL3)
3. appraise the role of big data, cloud computing, and data analytics in a typical IoT system (BL5)
4. design modern edge analytics applications for single-board computers and microcontrollers. (BL6)

Unit	Contents	Teaching Hours (Total 30)
Unit-I	**Introduction to IoT:** applications, IoT architectures, introduction to analytics, IoT analytics challenges	02
Unit-II	**IoT Networking:** IoT devices, Networking basics, IoT networking connectivity protocols, IoT networking data messaging protocols, analyzing data to infer protocol and device characteristics	07
Unit-III	**IoT Analytics for the Cloud:** Introduction to elastic analytics, Decouple key components, Cloud security and analytics, designing data processing for analytics, Applying big data technology to storage	05
Unit-IV	**Exploring IoT Data:** Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis	06
Unit-V	**Data Science for IoT Analytics:** Introduction to Machine Learning, Feature engineering with IoT data, Validation methods, Understanding the bias-variance tradeoff, Use cases for deep learning with IoT data	05
Unit-VI	**Edge AI and Analytics:** Optimizing and deploying models on edge devices, Monitor and audit edge analytics.	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 content.

Suggested Readings/ References:

1. Minteer, Andrew, Analytics for the Internet of Things (IoT), Packt Publishing Ltd.
2. Colin Dow, Hands-on Edge Analytics with Azure IoT, Packt Publishing Ltd.
3. Gerardus Blokdyk, IoT Edge Analytics, 5starcooks
4. Kai Hwang, Min Chen, Big-Data Analytics for Cloud, IoT and Cognitive Computing, Wiley
5. Hwaiyu Geng, Internet of Things and Data Analytics Handbook, Wiley
6. John Soldatos, Building Blocks for IoT Analytics Internet-of-Things Analytics, RiverPublishers
7. Gerardus Blokdyk, IoT Analytics A Complete Guide, 5starcooks.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	IoT Applications Development with Cisco Packet Tracer	02
2	Programming the IoT boards: ESP8266/ESP32/Arduino with IDE	02
3	IoT Sensor and Actuator integration with ESP32/ESP8266 with WiFi and HTTP	02
4	Implementing REST API Server for IoT devices	04
5	Publish and Subscribe with MQTT Client and MQTT Broker using RPi/ESP8266/ESP32	02
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 DL inference models on Edge Computing devices.	04