

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	Integrated B.Tech.(CSE)-MBA
Course Code:	CSI0908
Course Title:	IoT Analytics
Course Type:	(<input type="checkbox"/> Core/ <input type="checkbox"/> Value Added Course / <input checked="" type="checkbox"/> Department Elective / <input type="checkbox"/> Institute Elective/ <input type="checkbox"/> University Elective/ <input type="checkbox"/> Open Elective / <input type="checkbox"/> Any other)
Year of Introduction:	2022-23

L	T	Practical Component				C
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Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. summarize the architectural components and platforms of 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 applications with suitable lightweight data processing and communication methodologies (BL6)

Syllabus:

Total Teaching hours: 30

Unit	Syllabus	Teaching hours
Unit-I	Introduction to IoT: importance and applications, IoT architectures, introduction to analytics, IoT analytics challenges	03
Unit-II	IoT devices, Networking basics, IoT connectivity protocols, IoT networking and data messaging protocols, analyzing data to infer protocol and device characteristics	06
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	06
Unit-IV	Exploring IoT Data: Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis	05
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	07
Unit-VI	Strategies to Organize Data for Analytics: Linked Analytical Datasets, Managing data lakes, data retention strategy	03

Self-Study:

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

Suggested Readings/References:

1. Minter, 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.	Practical Title	Hours
1	Programming the boards ESP8266/ESP32 with Arduino IDE	02
2	IoT Sensor and Actuator integration with ESP32/ESP8266 with WiFi and HTTP	02
3	Publish and Subscribe with MQTT Client and MQTT Broker using RPi/ESP8266/ESP32	02
4	IoT Application Development with NodeRed: MQTT Client and Broker	02
5	IoT Application Development with NodeRed: MQTT, NoSQL DB, HTTP client and server	02
6	IoT Application Development with NodeRed: Designing Dashboard for IoT Data	02
7	Integrating different IoT platforms and managing sensor data with Cloud Platform for analytics	02
8	Designing IoT Analytics Pipeline on Cloud Platform	02
9	Analysing and Processing IoT Data with ML approaches	02
10	IoT Data Visualization with Dashboards on Cloud Platform	02

Suggested Case List:

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