M.Sc. Data Science & IoT – Finalized Syllabus

Unit 1: Fundamentals of Data Science

- Introduction to Data Science & Its Applications
- Data Types, Collection, and Preprocessing
- Exploratory Data Analysis (EDA)
- Basics of Statistics (Mean, Median, Probability, Distributions)
- Introduction to Python for Data Science (NumPy, Pandas, Matplotlib)

Unit 2: Machine Learning for IoT

- Overview of Machine Learning (Supervised vs. Unsupervised)
- Regression & Classification Techniques (Linear Regression, Decision Trees, Random Forest)
- Clustering Methods (K-Means, DBSCAN)
- **Feature Engineering for IoT Data** (Handling Noisy & Time-Series Data)
- **Anomaly Detection in IoT Data** (For Security & Predictive Maintenance)
- Basics of Time Series Analysis for IoT
- Introduction to Edge AI & TinyML (Lightweight ML Models for IoT)

Unit 3: Fundamentals of IoT

- Introduction to IoT and Its Importance
- IoT Architecture (Devices, Sensors, Networks, Cloud)
- Communication Protocols (MQTT, HTTP, LoRa)
- **5G & IoT – Enhancing Scalability and Latency**
- **Microcontrollers & IoT Devices** *(Hands-on session with ESP32 or Raspberry Pi instead of covering multiple separately)*
- Basics of Cloud Computing for IoT (**ThingSpeak , blynk , Arduino IoT Cloud etc**)

Unit 4: Practical IoT Concepts

- **IoT Security & Privacy** (Encryption, Secure Communication, Blockchain for IoT Security)
- Data Storage & Processing in IoT (Cloud vs Edge)

- IoT Networking Basics (WiFi, Bluetooth, LPWAN)
- **IoT Device Power Management** *(Optimizing battery life & energy-efficient computing)*
- Real-World IoT Applications (Smart Homes, Healthcare, Agriculture)
- Simple IoT Project Demonstrations

Unit 5: Integration of Data Science & IoT

- Why Data Science is Important for IoT
- How IoT Generates Data & Its Challenges
- Real-Time IoT Data Processing & Analysis
- Predictive Maintenance with IoT Sensors
- **Federated Learning for IoT** (Decentralized Model Training)
- **Deep Learning for IoT** *(MobileNet & lightweight DL models for Vision-based IoT)*
- Introduction to AI in IoT (Voice Assistants, Smart Cameras)

Unit 6: Ethical, Social & Future Aspects of Data Science & IoT

- Ethics in Data Science & IoT (Privacy, Security, Bias)
- **Blockchain for IoT** (Securing IoT Data & Authentication)
- Environmental Impact of IoT (E-Waste, Energy Consumption)
- Challenges in Large-Scale IoT Deployments
- **Digital Twin Technology** *(Simulations & Real-time Monitoring in Industry 4.0)*
- Future Trends in IoT & AI Integration
- Case Studies: Smart Cities, Industry 4.0, Healthcare IoT