



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Internet of Things

Subject Code : ME02062061

Subject Name : Deep Learning Techniques

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Probability Theory, Fundamental of IoT, Computer Programming, Python
Rationale:	Feature extraction capabilities, knowledge of algorithms such as CNN, LSTM, RNN.

Course Outcome:

After completion of the Course, Students will be able to:

No	Course Outcomes	RBT Level*
01	Understanding of fundamental of AI and ML	UN
02	Demonstrate supervise and un supervise algorithm performance	AP
03	Implement various DL models (i.e. CNN, RNN)	AP
04	Analyze performance of DL model for IoT applications	AN
05	Evaluate security measure of various models for IoT application.	EL

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	30	30	20	150



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Course Content:

Sr No	Course Content	No of Hours	% of Weightage
1	Unit 1 - Introduction to IoT and Deep Learning: Introduction to IOT: layer architecture, applications, key challenges in iot. Introduction to deep learning: AI vs ML vs DL. Role of deep learning in IOT.	3	10
2	Unit 2 - Machine Learning Foundations for IoT: Overview of Machine Learning Algorithms: Supervised, Unsupervised, and Reinforcement Learning. Key Concepts: Feature Extraction, Overfitting, and Generalization. Data Collection from IoT Devices: Preprocessing, Data Cleaning, Feature Engineering	7	15
3	Unit 3 -Fundamentals of Deep Learning: Artificial neuron, ANN, forward and back propagation, activation function, loss function, optimization, learning rate. Introduction to Deep Learning Architectures: Feedforward Networks, CNNs, RNNs. Training DL models, (Overfitting and Under fitting, train- test-validation, batch size, epoch)	10	20
4	Unit 4 - Deep Learning for Time-Series and Streaming IoT Data: Time-Series Data in IoT: Sensors, Streaming Data, and Challenges. Long Short-Term Memory (LSTM), Gated Recurrent Units (GRU). Real-time Data Processing with Edge AI	6	15
5	Unit 5 - Convolutional Neural Networks for IoT Applications: IoT Applications using CNN: Image Recognition, Object Detection, and Smart Surveillance. CNN Architectures: LeNet, AlexNet, VGG, ResNet. Edge AI and Lightweight CNN Models for Embedded IoT Devices.	8	20
6	Unit 6 - Deep Learning and IoT Security: Security Challenges in IoT Networks, Intrusion Detection using Deep Learning Models, Anomaly Detection in IoT Data, Adversarial Attacks and Defenses in Deep Learning Models for IoT.	8	20
TOTAL		45	100



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Reference Book:

- Internet of Things: Principles and Paradigms by Rajkumar Buyya, Amir Vahid Dastjerdi
- "Data Science for IoT Engineers" by Hassan Mahmud.
- Pattern Recognition and Machine Learning by Christopher Bishop
- Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
- Deep Learning for Time Series Forecasting by Jason Brownlee
- Neural Networks and Deep Learning by Michael Nielsen
- Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms by Nikhil Buduma
- Security and Privacy in Internet of Things (IoT): Models, Algorithms, and Implementations by Fei Hu

Suggested Course Practical List:

- The practical work will be carried out based on the content covered during the academic session.

List of Laboratory/Learning Resources Required:

- List of Hardware: NIL
- List of Software:
- List of Open Source Tools/Simulator:
- List of Useful websites/MOOCs:
