

# **CERTIFICATE COURSE IN MACHINE LEARNING & ARTIFICIAL INTELLIGENCE**

**(6 Months)**



**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING  
SANKETHIKA VIDYA BHAVAN, MASAB TANK, TELANGANA:HYDERABAD**

## **Certificate Course in Machine Learning & Artificial Intelligence**

**Duration of the Course** : **6 Months**

**Eligibility** : **Intermediate or its equivalent**

**Total Teaching Hrs** : **250 Hrs**

### **Scheme of Instruction and Examination**

Sub Code	Subject Name	Instruction Period/Week		Total Periods	Scheme of Examination			
		Theory	Practical		Duration	Internal Marks	End Exam Marks	Total Marks
THEORY								
MLAI-101	Machine Learning	03	-	50	3Hrs	0	100	100
MLAI-102	Artificial Intelligence	03	-	50	3Hrs	0	100	100
PRACTICALS								
MLAI-103	Machine Learning Lab	-	04	75	3Hrs	40	60	100
MLAI-104	Artificial Intelligence Lab	-	04	75	3Hrs	40	60	100
	TOTAL	06	08	250		80	320	400

## **Certificate Course in Machine Learning & Artificial Intelligence**

<b>Subject Code</b>	:	MLAI-101
<b>Subject Name</b>	:	Machine Learning
<b>Periods/Week</b>	:	03 Hrs
<b>Total Periods</b>	:	50 Hrs

### **About Course**

This Course is an intensive application oriented, real-world scenario based program in Machine Learning. It is designed to give the participant enough exposure to the variety of applications that can be built using techniques covered under this program. No prior knowledge of statistics or modeling is assumed.

**Course Objectives:** This course enables the students to

- Acquire advanced Data Analysis skills.
- Create ML solutions for various business problems.
- Apply ML methods, techniques and tools immediate.

**Course Outcomes:** On completion of this course the students are able to

- Automate data analysis using python
- Describe Machine Learning
- Work with real-time data
- Learn tools and techniques for predictive modeling
- Discuss Machine Learning algorithms and their implementation
- Validate Machine Learning algorithms

## **UNIT-1: Python Programming Essentials (8 Hrs)**

Need for Programming, Advantages of Programming, Overview of Python, Organizations using Python, Python Applications in Various Domains, Python Installation, Variables Operands and Expressions, Conditional Statements, Looping Statements, Command Line Arguments.

## **UNIT-2: Data Management (7 Hrs)**

Data Acquisition, Data Pre-Processing, Transformation, Handling of Text Data, Regular Expressions, Data Visualization, Sentiment Analysis.

## **UNIT -3: Predictive Analytics (7 Hrs)**

Linear Regression, Multiple Linear Regression, Non-Linear Regression.

## **UNIT -4: Unsupervised Learning: Clustering (7 Hrs)**

Distance measures, Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering, Dealing with continuous, categorical values in K-Means, Constructing a hierarchical cluster, K-Medoids, k-Mode and density-based clustering, Measures of quality of clustering.

## **UNIT -5: Supervised Learning: Classification (7 Hrs)**

Naïve Bayes Classifier, K-Nearest Neighbors, Support Vector Machines, Decision Trees Random Forest.

## **UNIT -6:**

### **PART-I Association Rules Mining and Recommendation Systems (7 Hrs)**

What are Association Rules, Association Rule Parameters, Calculating Association Rule Parameters, Recommendation Engines, Collaborative Filtering, and Content Based Filtering.

### **PART-II Business Use Cases: (7 Hrs)**

Case Study1: Sentiment Analysis

Case Study2: Customer Segmentation and Value

## **Certificate Course in Machine Learning & Artificial Intelligence**

<b>Subject Code</b>	<b>:</b>	<b>MLAI-102</b>
<b>Subject Name</b>	<b>:</b>	<b>Artificial Intelligence</b>
<b>Periods/Week</b>	<b>:</b>	<b>03 Hrs</b>
<b>Total Periods</b>	<b>:</b>	<b>50 Hrs</b>

### **About Course**

Artificial Intelligence is utilized heavily in computing cognitive functions such as speech and Vision. Often these functions are achieved through the use of Neural networks. In this module, we will study very popular NN architectures for achieving various cognitive functions such as Object recognition, natural language processing besides explore reinforcement learning.

**Course Objectives:** This course enables the students to

- Acquire advanced Data Analysis skills.
- Create AI solutions for various business problems.
- Apply AI methods, techniques and tools immediate.

**Course Outcomes:** On completion of this course the students are able to

- Automate data analysis using python
- Explain Time Series and its related concepts
- Gain expertise to handle business in future, living the present
- Convolution and Pooling layers in a CNN
- Understanding and Visualizing a CNN

**UNIT-1: Basics of Statistics (10 Hrs)**

Data exploration (histograms, bar chart, box plot, line graph, scatter plot) , Qualitative and Quantitative Data ,Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation).

**UNIT -2: Foundation for AI (8 Hrs)**

AI: Application areas

AI Basics (Divide and Conquer, Greedy, Branch and Bound, Gradient Descent)

NN basics (Perceptron and MLP, FFN, Back propagation)

**UNIT -3: Convolution Neural Networks (8 Hrs)**

Image classification, Text classification, Image classification and hyper-parameter tuning  
Emerging NN architectures.

**UNIT -4: Recurrent Neural Networks (8 Hrs)**

Building recurrent NN, Long Short-Term Memory, Time Series Forecasting

**UNIT -5: Deep Learning (8 Hrs)**

Auto-encoders and unsupervised learning, stacked auto-encoders and semi-supervised learning, Regularization - Dropout and Batch normalization.

**UNIT -6: Business Use Cases: (8 Hrs)**

Case Study1: Sentiment Analysis

Case Study2: Credit card Fraud Analysis

Case Study3: Customer Segmentation and Value

## **Certificate Course in Machine Learning & Artificial Intelligence**

<b>Subject Code</b>	<b>:</b>	MLAI-103
<b>Subject Name</b>	<b>:</b>	Machine Learning LAB
<b>Periods/Week</b>	<b>:</b>	04 Hrs
<b>Total Periods</b>	<b>:</b>	75 Hrs

**Course Objectives:** This course will enable students to

- Acquire advanced Data Analysis skills.
- Create ML solutions for various business problems.
- Apply ML methods, techniques and tools immediate.

### **List of Experiments**

1. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.
2. a) Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.  
b) Write a program to test Polynomial Regression for appropriate data set.
3. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set
4. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
5. a) Write a program to implement Logistic Regression for appropriate data set.  
b) Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
6. Write a Program to Implement Support Vector Machine Algorithm.

## **Certificate Course in Machine Learning & Artificial Intelligence**

<b>Subject Code</b>	<b>:</b>	<b>MLAI-104</b>
<b>Subject Name</b>	<b>:</b>	<b>Artificial Intelligence LAB</b>
<b>Periods/Week</b>	<b>:</b>	<b>04 Hrs</b>
<b>Total Periods</b>	<b>:</b>	<b>75 Hrs</b>

**Course Objectives:** This course will enable students to

- Acquire advanced Data Analysis skills.
- Create ML solutions for various business problems.
- Apply ML methods, techniques and tools immediate.

### **List of Experiments**

7. a) Write a program to implement simple chat bot?  
b) Write a python program to remove stop words for a given passage from a text file using NLTK?
8. Write a python program to implement stemming for a given sentence using NLTK?
9. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
10. Write a python program to for Text Classification for the give sentence using NLTK?
11. a) Study and implementation of Time Series Forecasting with ARIMA Model by using appropriate dataset.  
b) Study and Implementation of Time Series Forecasting with Auto Regression (AR Model) by using appropriate data set.
12. Develop and Evaluate Deep Learning Models using Keras by considering appropriate dataset.