

**CURRICULUM OF DIPLOMA PROGRAM IN ARTIFICIAL INTELLIGENCE****Core & Advanced Python:**

- Introduction to Python
- Installation of Python and Ipython Notebook (Jupyter Notebook)
- Python Objects
- Number & Booleans
- Strings
- Mutability of objects
- Operators
- Operators Precedence
- Conditions(If else elif)
- Loops(While & for)
- Break and Continue statements
- Range functions
- String object basics
- String methods
- Splitting and Joining Strings
- String format functions
- list object basics
- list methods
- List as stack and Queues
- List comprehensions
- Tuples, Sets, Bool
- Dictionary Object basics
- Dictionary Object methods
- Dictionary View Objects.
- Functions basics
- Parameter passing
- Iterators, Generator functions
- Lambda functions
- Map, Reduce, filter functions
- OOPS basic concepts
- Creating classes and Objects
- Inheritance
- Working with files
- Reading and writing files
- Buffered read and write
- Other File methods
- Using Standard Module
- Creating new modules
- Exceptions Handling- Try-except

- inserting and retrieving Table
- Updating and deleting the data.
- Sending email
- GUI Programming
- Testing

**Statistics:**

- Descriptive Statistics
- Sample vs Population statistics
- Random Variables
- Probability distribution function
- Expected value
- Binomial Distribution
- Normal Disrtributions
- z-score
- Central limit Theoram
- Hypothesis testing
- Z-Stats vs T-stats
- Type 1 type 2 error
- confidence interval
- Chi Square test
- ANOVA test
- F-stats

**Data Analysis:**

- Numpy variable
- Numpy manipulation
- Scipy
- Pandas intro
- Descriptive analysis
- Pandas Input-output
- Pandas manipulation
- Pandas groupby
- Matplotlib intro
- Bar charts histogram
- Scatter plot
- Stack charts
- Legend title Style
- Data Cleaning walkthrough
- Combining multiple datasets to get a single and clean dataset.

# Diploma Program in Deep Learning, Machine Learning and Artificial Intelligence

Prerequisites and Requirements- Basic familiarity with probability, set theory and linear algebra

## Machine Learning:

- ❖ Introduction
- ❖ Supervised
- ❖ Unsupervised
- ❖ Reinforcement
- ❖ Train & Test
- ❖ Validation Split
- ❖ Performance
- ❖ Overfitting & underfitting
- ❖ Linear Regression
- ❖ Assumptions
- ❖ R square adjusted R square
- ❖ Intro to Scikit learn
- ❖ Training methodology
- ❖ Logistics regression
- ❖ Precision Recall
- ❖ ROC curve
- ❖ F-Score
- ❖ Decision Tree
- ❖ Cross Validation
- ❖ Bias vs Variance
- ❖ Ensemble approach
- ❖ Bagging Boosting
- ❖ Randon Forest
- ❖ Variable Importance
- ❖ XGBoost
- ❖ K Nearest Neighbor
- ❖ Lazy learners
- ❖ Curse of Dimensionality
- ❖ KNN Issues
- ❖ Text Analytics
- ❖ Tokenizing
- ❖ Chunking
- ❖ Document term Matrix
- ❖ TFIDF
- ❖ Sentiment analysis hands on
- ❖ Hierarchical clustering
- ❖ K-Means
- ❖ Performance measurement
- ❖ Principal Component analysis
- ❖ Dimesionality reduction

- ❖ Factor Analysis
- ❖ Time Series Forecasting
- ❖ Moving Average
- ❖ ARIMA model

## Deep Learning:

- Basic of Neural Network
- NLTK
- Type of NN
- Cost Function
- Gradient descent
- Linear Algebra basics
- Vanilla implementation of Neural Network in python
- Tensorflow basics
- Hands on Simple NN with Tensorflow
- Word Embedding
- CBOW & Skip-gram
- Word Relations
- Convolutional Neural Network Maxpool
- Window padding
- Image classification using Convolutional Neural Network
- Recurrent Neural Network
- Long Short Term Memory (LSTM) architecture
- Building Story writer using character level RNN
- Sentiment Analysis Hands on
- Seq-to-Seq model
- Encoder Decoder
- GAN
- Generative Model Using GAN
- Semi-supervised learning using GAN
- Restricted Boltzmann Machine(RBM) and Autoencoders
- **Projects:**
  1. Spam Detection
  2. Image Classification

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## Artificial Intelligence (AI):

- ❖ Why do we need to study AI?
- ❖ Applications of AI
- ❖ Branches of AI
- ❖ Defining intelligence using Turing Test
- ❖ Making machines think like humans
- ❖ Building rational agents
- ❖ General Problem Solver
- ❖ Building an intelligent agent
- ❖ Understanding deep learning
- ❖ Understanding neural networks with TensorFlow
- ❖ deep dive understanding neural network with tensorflow
- ❖ master deep networks
- ❖ Convolutional neural network
- ❖ recurrent neural networks
- ❖ rbm and autoencoder
- ❖ Keras
  - Define Keras
  - Sequential Composition
  - Functional Composition
  - Predefined Neural Network Layers
  - What is Batch Normalization
  - Customizing the Training Process
  - Using TensorBoard with Keras
- ❖ TFLearn
  - Define TFLearn
  - Composing Models in TFLearn
  - Sequential Composition
  - Functional Composition
- ❖ Hands-On Practice
- ❖ **Projects:**
  1. Chatbot Applications

## Raspberry Pi Basics (IoT):

- Introduction to Raspberry Pi
- Hardware
- Ingredients
- Introduction to NOOBS
- SD Cards
- NOOBS for Raspbian
- SD Card Formatter
- Downloading & Installing NOOBS
- Preparing & Installing Raspberry Pi
- Connecting The Raspberry Pi
- Basic Networking
- Shutting Down
- Led Programming
- Switch and Led Programming
- Interfacing Relay
- Motor Interfacing
- Motor Driver ICs
- Relay Drivers ICs
- Other Peripheral Interfacing
- **Projects:**
  1. Device Controlling using voice command

## Introduction to Sixth Sense Technology:

- ✓ What is sixth sense?
- ✓ Why choose sixth sense technology?

## Applications:

- ❖ Predicting future, Chat Bots, Self-Driving Cars, Google AI Eye Doctor.
- ❖ AI Music Composer.
- ❖ AI Dream Machine.

\*\*\*\*\* All the Best \*\*\*\*\*

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