Artificial Intelligence Syllabus

Module 1: Introduction to Data Science

- What is Data Science?
- What is Machine Learning?
- What is Deep Learning?
- What is AI?
- Data Analytics & its types

Module 2: Introduction to Python

- What is Python?
- Why Python?
- Installing Python
- Python IDEs
- Jupyter Notebook Overview

Module 3: Python Basics

- Python Basic Data Types
- Lists
- Slicing
- IF Statements
- Loops
- Dictionaries
- Tuples
- Functions
- Array
- Selection by Position & Labels

Module 4: Python Packages

- Pandas
- NumPy
- Sci-kit Learn
- Mat-plot Library

Module 5: Importing Data

- Reading CSV Files
- Saving in Python Data
- Loading Python Data Objects
- Writing Data to CSV File

Module 6: Manipulating Data

- Selecting Rows/Observations
- Rounding Number
- Selecting Columns/Fields
- Merging Data
- Data Aggregation
- Data Munging Techniques

Module 7: Statistics Basics

- Central Tendency
  - Mean
  - Median
  - Mode
  - Skewness
  - Normal Distribution
- Probability Basics
  - What does mean by probability?
  - Types of Probability
  - ODDS Ratio?
- Standard Deviation
  - Data Deviation & Distribution
  - Variance
- Bias Variance Trade-off
  - Underfitting
  - Overfitting
- Distance Metrics
  - Euclidean Distance
  - Manhattan Distance
- Outlier Analysis
  - What is an Outlier?
  - Inter Quartile Range
  - Box & Whisker Plot
  - Upper Whisker
  - Lower Whisker

    - Scatter Plot
    - Cook's Distance
- Missing Value Treatment
    - What is a NA?
    - Central Imputation
    - KNN Imputation
    - Dummification
- Correlation
    - Pearson Correlation
    - Positive & Negative Correlation

Module 8: Error Metrics

- Classification
    - Confusion Matrix
    - Precision
    - Recall
    - Specificity
    - F1 Score
- Regression
    - MSE
    - RMSE
    - MAPE

Module 9: Machine Learning

Supervised Learning

- Linear Regression
    - Linear Equation
    - Slope
    - Intercept
    - R Square Value
- Logistic Regression
    - ODDS Ratio
    - Probability of Success
    - Probability of Failure
    - Bias Variance Tradeoff
    - ROC Curve
    - Bias Variance Tradeoff

Unsupervised Learning

- K-Means

- K-Means ++
- Hierarchical Clustering

SVM

- Support Vectors
- Hyperplanes
- 2-D Case
- Linear Hyperplane

SVM Kernel

- Linear
- Radial
- Polynomial

Other Machine Learning Algorithms

- K – Nearest Neighbour
- Naïve Bayes Classifier
- Decision Tree – CART
- Decision Tree – C50
- Random Forest

Module 10: Artificial Intelligence

AI Introduction

- Perceptron
- Multi-Layer Perceptron
- Markov Decision Process
- Logical Agent & First Order Logic
- AI Applications

Module 11: Deep Learning Algorithms

- CNN – Convolutional Neural Network
- RNN – Recurrent Neural Network
- ANN – Artificial Neural Network

Introduction to NLP

- Text Pre-processing
- Noise Removal

- Lexicon Normalization
- Lemmatization
- Stemming
- Object Standardization

Text to Features (Feature Engineering)

- Syntactical Parsing
- Dependency Grammar
- Part of Speech Tagging
- Entity Parsing

NLP Topics

- Named Entity Recognition
- Topic Modelling
- N-Grams
- TF – IDF
- Frequency / Density Features
- Word Embeddings

Tasks of NLP

- Text Classification
- Text Matching
- Levenshtein Distance
- Phonetic Matching
- Flexible String Matching

LLM

- Classification
- Regression