**Machine Learning & Artificial Intelligence (6th Jan 25 – 28th Feb 25)**

**Python Programming**

        Introduction to Python

        Data Types, Variables

        Operators

        data types in programs

        Flow of Control (Modules, Branching)

        If, If- else, Nested if-else

        Looping, For, While

        Nested loops

        Control Structure

        Uses of Break & Continue

        Pass, Strings and Tuples

        Formatting Strings, String slices

        Dictionaries, Defining Dictionaries

        Modifying Dictionaries, Deleting Items from Dictionaries

        Introducing Lists

        Defining Lists

        Declare, assign and retrieve values from Lists

        Accessing list, Operations in Lists

        Adding Elements to Lists, Searching Lists

        Deleting List Elements, Using List Operators

        Mapping Lists, Joining Lists and Splitting Strings

        Function and Methods

        Defining a function, Calling a function

        Types of functions, Function Arguments

        Anonymous functions

        Using Optional and Named Arguments

        Using type, str, dir, and Other Built-In Functions

        Introducing Tuples

        Accessing tuples, Operations

        Object Oriented Python

        OOPs concept

        Indenting Code, Native Data types

        Object References, Class and object

        Inheritance

        Overloading & Overriding

        Data hiding

        Operations Exception

        Exception Handling

        User Defined Exceptions

        Introduction and Installation of Machine learning packages like PANDAS, NUMPY, matplotlib, Seaborn)

**Machine Learning**

        What is machine learning

        Python Packages for Machine Learning

        Algorithm types of Machine learning

        Supervised and Unsupervised Learning

        Uses of Machine learning

        Evaluating ML techniques

        Data Preprocessing concepts and hands on practice using python packages

        Unsupervised Algorithms

        Clustering, Hierarchical Clustering & K means

        Evaluation of Clusters

        Clustering Case Study

        Principal Component Analysis

        Supervised Algorithms

        Linear Regression

        Decision Trees

        Regression Trees

        Decision Trees case study

        Bayesian analysis and Naive bayes classifier

        Assigning probabilities and calculating results

        Naïve Baye’s case study

        K-Nearest Neighbors Algorithm and case study

        Ensemble Learning

        Concept of Model Ensembling

        Random forest

        Gradient boosting Machines

        Model Stacking

        Support vector Machines

        Basic classification principle of SVM

        Linear and Non linear classification (Polynomial and Radial)

        Association rules mining

        Apriori and FP-growth algorithms

**Fundamental of Artificial Intelligence**

        Why AI Now? Revolution of AI

        Philosophies of CS & AI

        Strong and Weak AI

        AI Evolution: Turing's Work, Turing Machine & Test

        Structure of AI

        Real world Implications

        Revolution & Current Trends in AI

        Being Human in the Age of AI

        Applications in various Domains

        Supervised & Unsupervised Learning

        Knowledge Representation

        Problem Solving

        Types of Search, Search Methodologies

        Classical Search Methodologies, Beyond Classical Search

        Intelligent Agents, Uninformed Search

        Inference and Resolution for Problem Solving

        Propositional and Predicate Logic

**Introduction to Deep Learning**

* Neural Network and its applications
* Single layer neural Network
* Constructing Neural Networks model
* Overview of Feed Forward Neural Network
* Back propagation
* Activation Functions: Sigmoid, Hyperbolic Tangent
* Introduction to deep Learning
* Why is Deep Learning taking off
* Deep Learning Architecture
* Introduction to Tensorflow
* Introduction to Keras
* Building blocks of deep neural networks
* Activation Functions
* Why non-linear activation functions
* Computer Vision
* Introduction to Convolutional Neural Network
* Sequence Modeling
* Recurrent Neural Network
* Real world case studies for CNN and RNN Model

**Introduction to NLP**

* Overview of NLP
* Pre-processing
* Need of Pre-processing Data
* Introduction to NLTK
* Using Python Scripts
* Shallow Parsing
* Deep Parsing
* Text featurization technique
* NLP with Machine Learning and Deep Learning
* Word2Vec models
* Building NLP Application

**AI Compute Platforms and Trends**

**Apache Spark**

        Basics of Spark

        Deploying to a Cluster Spark Streaming

        Spark Data Frames/Spark SQL, Integration of Spark and Kafka

        Connecting DB’s with Spark

* AI Future Trends

**DevOps for AI/ML**

        Introduction to DevOps

        Introduction to Containers

        Advantages of using container based applications

        Installing docker and using basic docker commands

        Build your own container based application image

        Git/Github: Introduction to Version control systems

        Creating Github repository

        Using Git – Introduction to git commands

        Introduction to CI/CD

        Using Jenkins to build a CI/CD pipeline