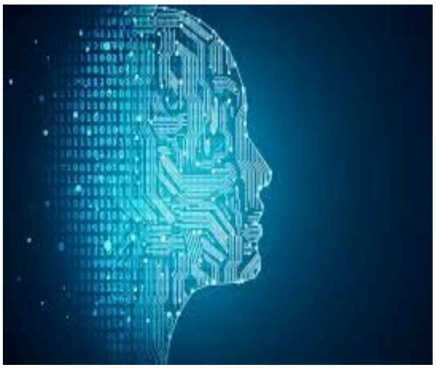
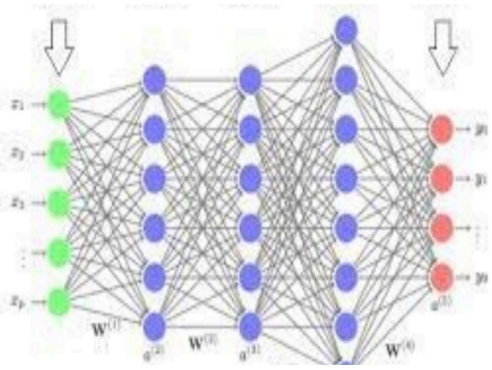
IIT Kanpur Certificate Program on PYTHON for Artificial Intelligence Machine Learning and Deep Learning 01st to 27th December 2024

Organized by Prof. Aditya K. Jagannatham, EE Department, IIT Kanpur


Program

Below is the detailed day-to-day & slot-wise program with Lecture Modules & Hands-On Coding Sessions for the IIT Kanpur Certificate Program on PYTHON for Artificial Intelligence Machine Learning and Deep Learning from 1st to 27th December 2024

	1st December, 2024
12:00 PM - 1:00 PM	Zoom Test Session
	Week-1
	2nd December, 2024
06:00 PM - 7:30 PM	**Lecture 1:** Introduction to Artificial Intelligence (AI) Machine Learning (ML), Overview of AI, ML, Regression, Classification, Supervised/ Unsupervised, Deep Learning, Test-Train Split, Metrics
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Lecture 2:** Linear Algebra for AIML, Vector Representation, Inner Product, Orthogonality, Matrices, Inversion
	3rd December, 2024
6:00 PM - 7:30 PM	**Lecture 3:**Linear Regression Based Prediction for AIML, Multiple Regressors, Model Computation, Pseudo inverse, Online Learning
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 1:** IRIS Dataset Regression using PYTHON, IRIS Dataset Features, Linear Regression Module, MSE, R2 Score
	4th December, 2024
	Break Day
	5th December, 2024
06:00 PM - 07:30 PM	**Lecture 4:** Logistic Regression-Based AIML, Logistic Function, Probabilities, Likelihood and ML, Logistic Regression Metrics, Confusion Matrix
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 2:** Boston Housing Price Analysing using PYTHON-Based Regression, Boston Housing set Features, Model Fitting, Model Performance, MSE, R2 Score, Regression Plot

	6th December, 2024
06:00 PM - 7:30 PM	**Lecture 5:** Support Vector Classifier (SVC) for Machine Learning, SVM Structure, Maximum Margin Classifier, Convexity and Convex Optimization, Kernel SVM
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 3:** SCIKIT Package for Logistic Regression using Purchase/ Shopping Data, Dataset Features, Logistic Model Fitting, Confusion Matrix Display, Accuracy Score
	Week-2
	9th December, 2024
06:00 PM - 7:30 PM	**Lecture 6:** Naïve Bayes Technique for AIML, Feature Vector, Likelihood and Prior Probabilities, Naïve Bayes Principle, Posterior Probability Evaluation, Gaussian Naïve Bayes
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 4:** IRIS Data Set classification using PYTHON-Based SVC, Dataset Features, Accuracy Metrics, Performance Evaluation
	10th December, 2024
06:00 PM - 7:30 PM	**Lecture 7:** Discriminant Analysis (LDA) Based Data Classification, Gaussian Density, Multivariate Gaussian, Gaussian/ Linear Discriminant, Example Model Computation
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 5:** Breast Cancer Dataset Analysis using SVC, Breast Cancer Dataset Features, Gaussian Kernel, Polynomial Kernel, Sigmoid Kernel **Project 6:** Naïve Bayes Clustering of Purchase Dataset using SCIKIT, Purchase Dataset Features, Gaussian NB Model Fitting, Accuracy Metrics, Confusion Matrix Display
	11th December, 2024
	Break Day
	12th December, 2024
06:00 PM - 7:30 PM	**Lecture 8:** Data Clustering for AIML, K-Means Algorithm, Centroid Computation, Cluster Assignment, Elbow Method for Number of Clusters, Silhouette Score
7:30 PM-8:00 PM	Break
8:00 PM - 09:15 PM	**Project 7:** Discriminant Based Data Classification using IRIS Data Set, IRIS Dataset Features, LDA Model Fitting, Performance Visualization
	13th December, 2024
06:00 PM - 7:30 PM	**Lecture 9:** Decision Tree Classifiers (DTC) for AIML, Optimal Feature Selection, Entropy, Conditional Entropy, Information Gain, Computation of Practical Example
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 8:** PYTHON Project for Data Clustering, K-Means Implementation, Elbow Curve, Silhouette Plot, Cluster Visualization
	Week-3
	16th December, 2024
06:00 PM - 7:30 PM	**Lecture 10:** Introduction to Neural Networks (NNs), Neuron Structure and Properties, ANN Model, Activation Functions, One Hot Encoding, Categorical Crossentropy
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 9:** Building a Decision Tree Classifier for IRIS Dataset using PYTHON, IRIS Dataset Features, DTC Model Fitting, Accuracy Score, Confusion Matrix
	17th December, 2024
06:00 PM - 7:30 PM	**Lecture 11:** Deep Learning, Multi-layer Neural Networks, DNN Models, Dense and Sequential Architectures, NN Notation, Multi-layer Neural Nets, Gradient Descent, Backpropagation, Dropout
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 10:** Building a Decision Tree Classifier using the Purchase Logistic Data Set, Purchase Dataset Features, DTC Plotting, DTC Prediction, Performance Metrics
	18th December, 2024
	Break Day

	19th December, 2024
06:00 PM - 7:30 PM	**Project 11:** Building a Neural Network using PYTHON for the Boston Housing Dataset, Boston Dataset Features, Sequential NN Model, Model Fitting, Epochs, Accuracy
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Lecture 12:** Convolutional Neural Networks, CNN Architectures, Convolution, Dot Product, Padding, Hierarchical Structure, Max/ Average Pooling
	20th December, 2024
06:00 PM - 7:30 PM	**Project 12:** Neural Network for analysis of Mobile Prices Dataset, Dataset Features, One Hot Encoding, Data Scaling, NN Model, Crossentropy, Adam Optimizer, Plots of Loss and Accuracy
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Test Prep 1:** Problem solving session for test/ job interview preparation
	Week-4
	23rd December, 2024
06:00 PM - 7:30 PM	Distinguished Guest Lecture I: Dr. Soumyadeep Dey, Sr. Applied Scientist at Microsoft, India
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 13:** Deep Learning for Fashion Classification using the MNIST Fashion DataSet, Dataset Features, Fashion MNIST (Modified National Institute of Standards and Technology) Dataset Description, Classes, CNN Modeling, CNN Training, Sparse Categorical Crossentropy, Loss/ Accuracy Plotting **Project 14:** Deep Learning for Digit Classification using Digit DataSet, MNIST Handwritten Digit Dataset, CNN Architecture, Data Encoding, Softmax Activation, Confusion Matrix, Plots of Loss and Accuracy
	24th December, 2024
	Break Day
	25th December, 2024
	Break Day
	26th December, 2024
06:00 PM - 7:30 PM	**Project 15:** Deep Learning using the CIFAR Dataset, CIFAR-10 dataset (Canadian Institute for Advanced Research, 10 classes), Dataset Visualization, CNN Architecture, Model Building and Compilation, Classification Accuracy and Confusion Matrix Metrics
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Test Prep 2:** Problem solving session for test/ job interview preparation
	27th December, 2014
06:00 PM - 07:30 PM	**Distinguished Guest Lecture II:Dr. Dheeraj Nagaraj, Research Scientist, Google**
7:30 PM-8:00 PM	Break
8:00 PM - 9:15 PM	**Project 16:** IMDB Dataset and Deep Learning for Movie Rating Classification, Internet Movie Database (IMDb) Dataset Description, Vectorization, Binary Crossentropy, Model Training, Training and Validation Accuracy Plots, Training and Validation Loss Plots