



Course Code	Course Name	Credits
20MCADC306	Machine Learning with Python	03

❖ Aim of the Course:

Machine learning is a flourishing area for researcher and developer to build various models to map with real life situation. Python programming knowledge is intended to be useful to data analyst, data scientist, data visualization, machine learning, deep learning, computer vision, natural language processing and many other computer science fields. Goal of this course is to understand and develop model of ML with Python.

❖ Course Overview and Context:

The course provides fundamental insight about types of machine learning, some of the methods of supervised and unsupervised learning, natural language processing, speech recognition, computer vision and fundamental image processing operations using python. The course focuses on conceptual as well as hands-on training on each topic.

❖ Course Outcomes:

Sr #	Course Outcome	Cognitive Level
1	To define and explain machine learning and its relation with AI and DL along with types of ML.	Remember, Understand
2	To determine regression or classification supervised learning method of ML to any real-life application and estimate accuracy of the model.	Understand, Apply, Evaluate
3	To be able to contrast various unsupervised learning methods and solve any real-life situation using ML and estimate accuracy of the model.	Understand, Apply, Evaluate
4	To Solve any fundamental text-processing and speech-recognition problem given.	Understand, Apply
5	To be able to determine filter operation on given image and construct a model to detect object from it.	Understand, Apply

❖ Content of the Course:

Unit-1 Introduction to Machine Learning

- **Introduction to ML:** Relation of ML with AI and DL, defining machine learning, how machines learn, types of machine learning: supervised learning, unsupervised learning, reinforcement learning, applications of machine learning.

Unit-2 Supervised Learning

- **Regression:** Pre-processing data using different techniques – mean removal, scaling, normalization, binarization, Label encoding, linear regression, Case study implementation using Python.
- **Classification:** Building simple classifier, logistic regression classifier, Naïve bayes classifier, training and testing dataset, accuracy using cross-validation, visualizing confusion matrix, extracting the performance report.
- **Predictive Modeling:** Building linear and non-linear classifier using Support Vector Machine (SVM), extracting confidence measurements, Case study implementation using Python.



Unit-3 Unsupervised Learning

- **Clustering:** data using k-means clustering, compressing image using vector quantization, Mean shift clustering model, agglomerative clustering, Case study implementation using Python.

Unit-4 Natural Language Processing and Speech Recognition

- **Natural Language Processing:** pre-processing data, stemming data, using lemmatization, diving chunks, text classifier, Case study implementation using Python.
- **Speech Recognition:** Reading and plotting audio data, transforming signal to frequency domain, synthesizing music, building speech recognizer, Case study implementation using Python.

Unit-5 Image filtering operations and Computer vision with OpenCV

- **Image filtering operations:** Edge detection and various image filters: Blur an image, detect edge in image, motion blur to an image, sharpen and emboss an image, erode and dilate image, enhance image contrast, applying advance image filters.
- **Object detection:** Detecting and tracking objects using Haar cascades from images and videos: Detecting face, eyes, mouth, nose, pupils

❖ Learning Resources:

Sr #	Textbook References Internet Links
1	"Machine Learning" by SaikatDutt, Subramanian Chandramouli, Amit Kumar Das – Pearson.
2	"Python Machine Learning Cookbook" by Prateek Joshi – PACKT Publishing – 2016 Edition.
3	"OpenCV : Computer Vision Projects with Python – Learning Path" by Joseph Howse, Prateek Joshi, Michael Beyeler – PACKT Publishing – 2016 Edition.

❖ Assignments (Optional):

Sr #	Description	Available From (Date)	Submission Date
1	Supervised and Unsupervised learning methods	After 3 Weeks	Within 10 Days
2	NLP, Speech recognition, Object detection, Image filtering operations	After 6 Weeks	Within 7 Days