



Diploma Program

Artificial Intelligence and Machine Learning

Subject Name: Introduction to Artificial Intelligence

Total Modules: 14

Unit – I

- Module 1: Introduction to Artificial Intelligence: Foundation of AI and History of AI
- Module 2: Intelligent agents and Concept of Rationality
- Module 3: Structure of Agents

Unit – II

- Module 4: The Predicate calculus and FOPL
- Module 5: Inference Rules and Clausal form
- Module 6: Resolution in AI

Unit – III

- Module 7: Search Strategies
- Module 8: Search Algorithms
- Module 9: Informed Search Algorithm
- Module 10: Computational Complexity

Unit – IV

- Module 11: Production System: Introduction, Characteristics & Disadvantages
- Module 12: Types of Production Systems: Commutative and Non-Commutative system
- Module 13: Types of Production Systems: Decomposable and Non-Decomposable systems and Control Strategies
- Module 14: Rule-Based Expert System



Subject Name: Introduction to Statistical Analysis

Total Units: 14

UNIT I

- Unit 1: Permutation and Combination
- Unit 2: Repetition and Constrained Repetition
- Unit 3: Binomial Coefficients
- Unit 4: Binomial Theorem

UNIT II

- Unit 5: Frequency Distributions
- Unit 6: Histograms and Frequency Polygons
- Unit 7: Measures of Central Tendency

UNIT III

- Unit 8: Elementary Probability theory
- Unit 9: Theoretical Distribution
- Unit 10: Relation between binomial and normal distribution

UNIT IV

- Unit 11: Linear correlation
- Unit 12: Measure of Correlation
- Unit 13: Least Square
- Unit 14: Regression Lines

Subject Name: AI - Soft Computing

Total Units: 14



UNIT I

- Unit 1: Introduction to Soft Computing
- Unit 2: Major Areas of Soft Computing
- Unit 3: Applications of Soft Computing

UNIT II

- Unit 4: Fundamentals of Neural Networks
- Unit 5: Back Propagation Networks
- Unit 6: Associative Memory
- Unit 7: Recent Applications of Neural Networks

UNIT III

- Unit 8: Fuzzy Set Theory
- Unit 9: Fuzzy Logic
- Unit 10: Fuzzy Decision Making
- Unit 11: Fuzzy Control Systems
- Unit 12: Fuzzy Classification

UNIT IV

- Unit 13: Genetic Algorithms
- Unit 14: Convergence of Genetic Algorithms

Subject Name: Programming in Python

Total Units: 14

UNIT I

- Unit 1: Python Basics Keywords and Identifiers
- Unit 2: Python Variables and Definitions
- Unit 3: Python Data Types
- Unit 4: Python Operators

UNIT II



- Unit 5: Python Control Statements
- Unit 6: Looping Statements - I
- Unit 7: Looping Statements - II

UNIT III

- Unit 8: Python Lists
- Unit 9: Python Tuples
- Unit 10: Python Sets
- Unit 11: Python Dictionary

UNIT IV

- Unit 12: Python Functions
- Unit 13: Arrays in Python
- Unit 14: Exception Handling in Python

Semester 2

Subject Name: Machine Learning

Total Units: 14

UNIT 1

- Unit 1: Introduction to Machine Learning, supervised, semi-supervised, unsupervised, reinforcement learning.
- Unit 2: Supervised Learning 1, Input representation, Hypothesis class, Version space, VC Dimension
- Unit 3: Supervised Learning 2, Probably Approximately Correct Learning (PAC), Noise, Learning Multiple classes, Model Selection and Generalization

UNIT 2

- Unit 4: Dimensionality reduction – Subset selection, Principal Component Analysis.
- Unit 5: Supervised Learning , Regression - Linear regression with one variable using gradient descent algorithm and matrix method



- Unit 6: Supervised Learning, , Linear regression with multiple variables using gradient descent algorithm and matrix method

UNIT 3

- Unit 7: Classification Performance measures 1 - Precision, Recall, Accuracy
- Unit 8: Classification Performance measures 2 - F-Measure, Receiver Operating Characteristic Curve(ROC)
- Unit 9: Classification Performance measures 3 - Area Under Curve AUC. Bootstrapping, Cross Validation
- Unit 10: Linear Methods for Classification 1 - Logistic regression, Naive Bayes
- Unit 11: Linear Methods for Classification 2 - Decision tree algorithm ID3, Support Vector Machine Regression

UNIT 4

- Unit 12: Basics of parameter estimation - Maximum Likelihood Estimation(MLE) and Maximum a Posteriori estimation(MAP). Bias-Variance decomposition.
- Unit 13: Unsupervised Learning 1 - Clustering Methods -Similarity measures, K-means clustering
- Unit 14: Unsupervised Learning 1 - Expectation-Maximization for soft clustering, Hierarchical Clustering Methods, Density based Clustering

Subject Name: Neural Networks

Total Units: 14

UNIT 1

- Unit 1: Artificial Neural Networks (ANN) and their biological roots and motivations.
- Unit 2: ANNs as numerical data/signal/image processing devices. a summing dendrite, synapses and their weights, pre- and postsynaptic signals
- Unit 3: Activation potential and activation function, Types of activating functions.
- Unit 4: Excitatory and inhibitory synapses. The biasing input.



UNIT 2

- Unit 5: Encoding (training phase) and decoding (active phase)
- Unit 6: Taxonomy of neural networks:-feedforward and recurrent networks with supervised and unsupervised learning laws
- Unit 7: Static &dynamic processing systems, basic data structures
- Unit 8: Mapping of vector spaces, clusters, and principal components.
- Unit 9: Linear Networks:-Adaline - the adaptive linear element, Linear regression. The Wiener-Hopf equation. The Least-Mean-Square

UNIT 3

- Unit 10: Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.
- Unit 11: Multi-Layer Feedforward Neural Networks:- Multi-Layer Perceptron's. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law.

UNIT 4

- Unit 12: Self-Organising Systems:-Unsupervised Learning
- Unit 13: Pattern clustering, Topological mapping, Kohonen's self-organizing map, Local learning laws-Generalised Hebbian Algorithm.
- Unit 14: Feedback neural networks:- Pattern storage and retrieval, Hopfield model, Boltzmann machine, Recurrent neural networks.

Subject Name: Machine Learning using Python

Total Units: 14

UNIT 1

- Unit 1: Numpy Library: Narray Object, Array Attributes, Array Creation Routines, Array from Numerical Ranges, Advanced Indexing, Broadcasting, NumPy - Iterating over Array.
- Unit 2: Array manipulation routines: basic operations, Changing array shape, Joining arrays, Splitting arrays, Adding and removing elements, Rearranging elements.
- Unit 3: String Functions: Basic String operations, Comparison, String information
- Mathematical Functions: Basic Mathematical Functions, Statistical Functions, Sort, Search & Counting Functions.



UNIT 2

- Unit 4: Getting Started with Pandas: Why Pandas, Features of Pandas.
- Unit 5: Data structures in Pandas: Series, DataFrame, Panel.
- Unit 6: Data Loading: Storage and File Formats, Reading and Writing Data in file.
- Unit 7: DataFrame creation: Using list, Using dict, Using ndarray, Using series. Using DataFrame. Viewing DataFrame elements: Using describe function, Using column name, Using iloc method, Using iat method, Using head(), Using tail(), Using index method

UNIT 3

- Unit 8: Data Visualization in Matplotlib: Features of Matplotlib.
- Unit 9: Anatomy of a Matplotlib Plot, Creating a Plot and Figure, Changing Figure Sizes.
- Unit 10: Chart properties: Creating a chart, Labeling the axes, Formatting line style and color, Saving the chart in a file, Styling the chart, Adding annotations, Adding legends.
- Unit 11: Data Cleaning and Preparation: Handling Missing Data, Data Transformation, String Manipulation, Combining and Merging Data Sets Reshaping and Pivoting.

UNIT 4

- Unit 12: SCIKIT-LEARN: Using Scikit-Learn for Linear Regression, Logistic Regression.
- Unit 13: Decision Tree, Naive Bayes, KNN.
- Unit 14: SVN, k Mean Clustering, Random Forest.

Subject Name: Project Work