



**Karmaveer Bhaurao Patil University, Satara**

**Syllabus for**

**Diploma-III (Artificial Intelligence with Python)**

**Under**

**Faculty of Science and Technology**

**(As per NEP 2020)**

**With effect from Academic Year 2024-2025**

**Department of Computer Science (Entire)**  
**Revised Syllabus of Diploma Program (UG) (2024-2025)**

**Preamble:**

Artificial Intelligence is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and Information Sciences in discovering new information and knowledge from large databases and optimize Human effort overall. It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines like Computer Science, Mathematics, Statistics, Information Technology

**Program Objectives**

1. To build a strong foundation in machine learning principles and techniques.
2. To equip students with skills to apply supervised and unsupervised algorithms effectively.
3. To develop the ability to analyze data and derive insights using ML models.

**Program Outcomes:**

1. To foster proficiency in using modern ML tools and frameworks. Apply foundational math and programming knowledge to build ML models.
2. Analyze real-world problems and select suitable learning techniques.
3. Design and implement effective supervised and unsupervised solutions.
4. Use modern ML tools and libraries proficiently.
5. Interpret model results to support data-driven decisions.

**III Year Diploma Program**

1. Title: Artificial Intelligence with Python
2. Year of Implementation: 2024-2025
3. Duration: One Year
4. Pattern: Semester
5. Medium of Instruction: English
6. Contact hours: 7 hours/week
8. Structure of Course:

### Syllabus Structure (UG):

| Year  | Semester                                                       | Course No. | Course Code | Content Hours | Credits<br>(1 Credit = 15H) | Marks |
|-------|----------------------------------------------------------------|------------|-------------|---------------|-----------------------------|-------|
| 1     | I                                                              | CTI        | DCSET101    | 30            | 2                           | 75    |
|       |                                                                | CLI        | DCSEL101    | 60            | 2                           | 75    |
|       | II                                                             | CTII       | DCSET202    | 30            | 2                           | 75    |
|       |                                                                | CLII       | DCSEL202    | 60            | 2                           | 75    |
|       | Annual                                                         | CPI        | DCSEP101    | 30            | 1                           | 50    |
|       | Total                                                          |            |             | 210           | 9                           | 350   |
| 2     | III                                                            | CTIII      | DCSET303    | 30            | 2                           | 75    |
|       |                                                                | CLIII      | DCSEL303    | 60            | 2                           | 75    |
|       | IV                                                             | CTIV       | DCSET404    | 30            | 2                           | 75    |
|       |                                                                | CLIV       | DCSEL404    | 60            | 2                           | 75    |
|       | Annual                                                         | CPII       | DCSEP202    | 30            | 1                           | 50    |
|       | Industrial and or Incubation and or Research or Field Training |            |             | 30            | 1                           | -     |
|       | Total                                                          |            |             | 240           | 10                          | 350   |
| 3     | V                                                              | CTV        | DCSET505    | 30            | 2                           | 75    |
|       |                                                                | CLV        | DCSEL505    | 60            | 2                           | 75    |
|       | VI                                                             | CTVI       | DCSET606    | 30            | 2                           | 75    |
|       |                                                                | CLVI       | DCSEL606    | 60            | 2                           | 75    |
|       | Annual                                                         | CPIII      | DCSEP303    | 60            | 2                           | 100   |
|       | Industrial and or Incubation and or Research or Field Training |            |             | 30            | 1                           | -     |
|       | Total                                                          |            |             | 270           | 11                          | 400   |
| Total |                                                                |            |             | 720           | 30                          | 1100  |

D: Diploma, CSE: Departmental Code (C: Chemistry, MI: Microbiology, CSE: Computer Science (Entire), etc.)

C: Course, T: Theory, L: Lab (Practical), P: Project

Total No. of Courses: 10 (Theory: 06, Practical: 06, Project: 03) Theory and Practical: Semester, Project: Annual

## **Semester-V**

### **DCSET 505: Machine Learning Concepts-I (Content Hrs. 30 Credits:2)**

#### **Course Objectives:**

Students will be able to

1. To introduce the fundamental principles of supervised learning and its applications.
2. To familiarize students with classification and regression techniques.
3. To develop the ability to evaluate and compare model performance using appropriate metrics.
4. To explore various supervised algorithms such as decision trees, SVMs, and neural networks.

#### **UNIT 1: Introduction to Machine learning**

**Concept of machine learning:** Essential concepts in Artificial Intelligence and Machine learning.

**Machine learning basics:** Key terminology, Key tasks of machine learning, choosing the right algorithm, Steps in developing a machine learning application.

**Splitting:** data in Machine.

#### **UNIT 2: Supervised Learning**

**Supervised Learning** The k-Nearest Neighbours classification algorithm , parsing and importing from a text file

**Creating Scatter plots :** matplotlib, normalizing numeric values.

**Decision tree classifier :** construction , plotting tress in python , testing and storing the classifier

#### **Course Outcomes:**

1. Understand and explain the key concepts and algorithms of supervised learning.
2. Design and implement classification and regression models for different applications.
3. Analyze and interpret the performance of supervised learning models
4. Apply appropriate preprocessing and feature engineering techniques.

#### **References:**

1. Kuhn, Max, and Kjell Johnson. Applied Predictive Modeling. New York: Springer, 2013.
2. Alpaydin, Ethem. Introduction to Machine Learning. 4th ed. Cambridge, MA: MIT Press, 2020.

3. Marsland, Stephen. Machine Learning: An Algorithmic Perspective. 2nd ed. Boca Raton, FL: CRC Press, 2014.
4. Mitchell, Tom M. Machine Learning. New York: McGraw-Hill, 1997.

## **DCSEL 505:(Practical)**

### **Course Objectives:**

Students will be able to

1. Machine Learning and its application oriented algorithms.
2. Introduction to Machine Learning using Python and its libraries.
3. Installation of pandas and use of pip command.
4. Example on Pandas
5. Python program using NumPy for some basic mathematical operations
6. Implementing KNN- classification algorithm using Python on IRIS dataset.
7. Python script using Scipy for image manipulation.
8. Program to get index and values of series in Pandas
9. Program to specify an index while creating series in Pandas.
10. Program to get the first or last few rows from Series in Pandas.
11. Program to rename DataFrame columns name in Pandas.
12. Program to Filter multiple rows using isin in DataFrame
13. Program to Adding new columns to existing DataFrame in Pandas
14. Program to select multiple columns in a Pandas Dataframe.
15. Program to check whether a pandas DataFrame is empty or not.

**Course Outcomes:**

1. To provide hands-on experience with supervised learning tools and real-world datasets.
2. To explore various supervised algorithms such as decision trees, SVMs, and neural networks.

**References:**

1. Géron, Aurélien. *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*. 2nd ed. Sebastopol, CA: O'Reilly Media, 2019.
2. Murphy, Kevin P. *Machine Learning: A Probabilistic Perspective*. Cambridge, MA: MIT Press, 2012.
3. James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani. *An Introduction to Statistical Learning*. 2nd ed. New York: Springer, 2021.
4. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. *Deep Learning*. Cambridge, MA: MIT Press, 2016.

## **Semester-VI**

### **DCSET 606: Machine Learning Concept-II (Content Hrs. 30 Credits:2)**

#### **Course Objectives:**

Students will be able to

1. To provide a comprehensive understanding of unsupervised learning techniques.
2. To introduce clustering, dimensionality reduction, and anomaly detection algorithms.
3. To develop the ability to interpret and evaluate unsupervised models.
4. To expose students to real-world applications like customer segmentation and recommendation systems.

#### **UNIT 1: Unsupervised learning**

Unsupervised learning: Clustering, Grouping unlabelled data using K-Means clustering, K-mean Algorithm, Naïve Bayesian decision theory, Conditional probability, classifying with conditional probabilities, Document classification with naïve Bayes, classifying text with python, Case study: classifying spam email with naïve Bayes.

#### **UNIT 2: Recommender System**

Recommender System: Introduction, Understanding Recommendation Systems, Content Based Filtering, User Based Collaborative Filtering, Item Based Collaborative Filtering, Methods and t of the trade, Issues in Recommendation Systems, Recommender System in Python.

#### **Course Outcomes:**

1. Understand and explain core unsupervised learning concepts and methods.
2. Implement clustering algorithms such as k-means, hierarchical, and DBSCAN.
3. Apply dimensionality reduction techniques like PCA and t-SNE.
4. Analyze real-world data using unsupervised learning models.

#### **References:**

1. Bishop, Christopher M. *Pattern Recognition and Machine Learning*. New York: Springer, 2006.
2. Hastie, Trevor, Robert Tibshirani, and Jerome Friedman. *The Elements of Statistical Learning*. 2nd ed. New York: Springer, 2009.
3. Murphy, Kevin P. *Machine Learning: A Probabilistic Perspective*. Cambridge, MA:

MIT Press, 2012.

4. Müller, Andreas C., and Sarah Guido. *Introduction to Machine Learning with Python*. Sebastopol, CA: O'Reilly Media, 2016.

## **DCSEL 606:(Practical)**

### **Course Objectives:**

Students will be able to

1. Python script using Scikit-learn for Decision Tree Classifier.
2. Python program using Theano for computing a Logistic Function.
3. Python program using TensorFlow for multiplying two arrays.
4. Python program using Pandas for arranging a given set of data into a table.
5. Python program using Matplotlib for forming a linear plot.
6. Python program on your local python interpreter, provided you have installed the libraries.
7. Import numpy package for arrays and stuff.
8. Program to check all elements are NaN in a NumPy Array in Python.
9. Program to check NumPy array is empty or not in Python.
10. Program to check for NaN elements in a NumPy array in Python or Not.

### **Course Outcomes:**

1. Analyze real-world data using unsupervised learning models.
2. Use tools such as Scikit-learn or TensorFlow for unsupervised learning tasks.

### **References:**

1. Aggarwal, Charu C. *Data Classification: Algorithms and Applications*. Boca Raton, FL: CRC Press, 2014.
2. Aggarwal, Charu C., and Chandan K. Reddy. *Data Clustering: Algorithms and Applications*. Boca Raton, FL: CRC Press, 2013.
3. Han, Jiawei, Micheline Kamber, and Jian Pei. *Data Mining: Concepts and Techniques*. 3rd ed. Burlington, MA: Morgan Kaufmann, 2011.
4. Kelleher, John D., Brian Mac Namee, and Aoife D'Arcy. *Fundamentals of Machine Learning for Predictive Data Analytics*. 2nd ed. Cambridge, MA: MIT Press, 2020.

**DCSEP303 (Project):**  
**(Contact Hrs. 30/60, Credits: 1/2)**

**BOS Sub-Committee**

1 . Mr.R.P. Waghmare

Chairman

2.Miss N.V. Lasure

Coordinator

**Expert Committee**

1.Mr Mayur More  
(Academic Expert)  
(S.G.M College, Karad)

2. Santosh Kapase  
(Industrial Expert)  
(Capgemini India)