

MCA404 Machine Learning with Python

Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks
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Prerequisite: -

1. Familiarity with the C and C++ programming language.

Course Objectives:

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python
4. To develop the ability to write database applications in Python
5. To introduce students to the basic concepts and techniques of Machine Learning.
6. To become familiar with regression methods, classification methods, clustering methods

Detailed Syllabus

UNIT I (8 Hours)

Introduction to Python: Importance of Python, Installing and working with Python in Windows, Linux and Mac, Using Python as calculator, Comments, How to define main function in Python
The concept of data types - Variables, Arithmetic Operators and Expressions.

UNIT II (8 Hours)

String manipulations - Subscript Operator, Indexing, Slicing a string, Converting strings to numbers and vice versa, split function, Control flow - if statements, for and while loops, nested loops, Short-circuit (lazy evaluation), range() function, break and continue statements, pass statements.

UNIT III (10 Hours)

Data Structures:Lists - Basic list operations, Replacing, inserting, removing an element; Searching and sorting a list, Methods of list objects, Using lists as Stacks and Queues, How efficient lists are when used as stack or queue, List and nested list Comprehensions Tuple, Sets, Difference between list and tuple, Dictionary - adding and removing keys, accessing and replacing values, traversing dictionaries.

UNIT IV (10 Hours)

Python functions and modules - OS and SYS modules, Defining python functions, calling a function, function arguments, Lambda and map function, Importing python module, **Useful Python Packages**—Beautiful soup, NumPy, iPython, tkinter, **Classes and OOP** - Class definition syntax, objects, class and instance variables, Inheritance and multiple inheritance, Polymorphism, Overloading, Overriding, Data Hiding.

UNIT V (10 Hours)

Overview of machine learning, related areas, applications, software tools. Supervised Learning: classification and regression. Unsupervised Learning. Reinforcement Learning. Parametric regression: linear regression, polynomial regression, logistic regression, locally weighted regression, numerical optimization, gradient descent, kernel methods.

UNIT VI (10 Hours)

DECISION TREE LEARNING - Decision tree learning algorithm-Inductive bias- Issues in Decision tree learning;Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms;Bayesian Learning: Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm;

Text and Reference Books

1. Python Programming for the Absolute Beginner By Laila M. Dawson
2. Learn Python the Hard Way By Zed A. Shaw Learning Python By Mark Putz Python Documentation (<https://docs.python.org>)
3. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
4. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
5. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
6. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Explain basic principles of Python programming language |
| 2. Implement object-oriented concepts |
| 3. Implement database and GUI applications. |
| 4. Gain knowledge about basic concepts of Machine Learning. |
| 5. Identify machine learning techniques suitable for a given problem |
| 6. Solve the problems using various machine learning techniques |