School of Computer Science & IT
Devi Ahilya Vishwavidyalaya

SYLLABUS

BCA 3 years/ BCA (Hons./ Research) 4 years

Program Educational Objectives (PEOs)

PEO 1: Exhibit a strong inclination towards higher education and actively pursue in continuous development of their professional skills.

PEO 2: Develop communication and soft skills to inculcate professionalism for working in cross-cultural and global environment.

PEO 3: Build expertise on latest technological trends to bridge gap between industry and academia for better employability.

PEO 4: Evolve competency to design and develop computing applications that address the societal needs.

Program Specific Outcomes (PSOs)

PSO 1: Apply knowledge of computing and inter-disciplinary techniques to design and develop quality software applications.

PSO 2: Ability to use modern tools and frameworks to create innovative solutions in emerging areas.

VI - SEMESTER

TAKSHASHILA CAMPUS, KHANDWA ROAD, INDORE (MP) - 452017, INDIA
For details, visit: https://scs.dauniv.ac.in/syllabus.php

CS-2520: INTRODUCTION TO CLOUD COMPUTING

Course Outcomes (COs):

CO1: Understand the basics, history, and characteristics of cloud computing.
CO2: Analyze various cloud service and deployment models and their applications.
CO3: Explore cloud technologies, virtualization, and system architecture.
CO4: Learn data storage management and basic cloud security mechanisms.
CO5: Gain practical knowledge of VirtualBox, Google Classroom, Hadoop, AWS, and GSuite.

Course Contents

UNIT-I **No. of Hours: 8**

Introduction to cloud computing, History, Importance of cloud computing in the current era, characteristics of cloud computing, what cloud computing really is and isn't, pros and cons of cloud computing, technologies in cloud computing.

UNIT-II **No. of Hours: 8**

Types of clouds, cloud infrastructure, cloud application architecture, working of cloud computing, trends in cloud computing, cloud service models, cloud deployment models, cloud computing and services pros and cons.

UNIT-III **No. of Hours: 8**

Cloud computing technology, cloud life cycle model, role of cloud modelling and architecture, cloud system architecture, virtualization, virtualization in cloud computing.

UNIT-IV **No. of Hours: 8**

Data storage, data storage management in cloud computing, file systems, cloud data stores, cloud storage characteristics, and an introduction to cloud security mechanisms.

UNIT-V **No. of Hours: 8**

VirtualBox: Installation, features and characteristics, application of virtualbox, Google class room etc, case-study. Introduction to hadoop, AWS and Gsuite

Text Books:

1. Mastering Cloud Computing: Foundations and Applications Programming by Christian Vecchiola, Rajkumar Buyya, and S. Thamarai Selvi

Reference Books:

1. Cloud Computing: A practical approach for learning and implementation, 1st edition, Pearson, A. Srinivasan, J. Suresh

Online Resources:

CS-4224: PYTHON PROGRAMMING

Course Outcomes (COs):

CO1: Identify and perform operations on various data types (e.g. numeric, strings, lists, tuples, dictionaries, sets).

CO2: Develop skill to solve real-world problems using functions, lists, and tuples.

CO3: Ability to create and work with immutable sets using the frozen set.

CO4: Handle complex problems using oops in python programming.

CO5: Ability to perform scientific computing and data analysis Python Libraries

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Course Contents

UNIT-I **No. of Hours: 10**

Introduction to Python Programming Language: Why and for What Python? Program execution Process, Built- in Data Types, Variables, Strings and String methods, Numbers, Basic Input ,Output and command line input, String formatting, Python literals, Operators: Arithmetic ,Comparison, Assignment, Logical, Bitwise, Membership, and Identity, Comments, Indentation, First Python program, Styling Python code. Conditional Statements- If, If-else, Nested If-else, Iterative Statement –For, While, Nested Loops, Control statements – Break, Continue, Pass.

UNIT-II **No. of Hours: 8**

Functions: How functions communicate with their environment? Types of function, function creation, types of function creation, calling, passing parameters, Function Scopes, types of Arguments passed in function, Lamda Function. List: Basic List operations, Indexing, Slicing, organizing a list, Built-in functions of list, Conditional Execution, Boolean Expressions, Conditional Statements with Lists, List Comprehension Expression, While and For Loop, Iterations, Documentation Interlude. Tuple: definition, Creation, accessing, deletion, Iteration, converting between list and tuple.

UNIT-III **No. of Hours: 8**

Set: Definition, Creation, accessing set, Operation on Set, Built-in methods of set. Frozenset: Need, Creation, operation on Frozenset , built-in functions of frozen set, Difference b/w Set and Frozen set Dictionaries: Definition, Creation, Processing, Accessing, Adding, Modification and Deletion Dictionary elements ,Restriction on keys and values ,Operators and Built- in Functions.

UNIT-IV **No. of Hours: 7**

Introduction to Modules and Packages, some useful Modules, Object- Oriented Programming Concepts: Classes and Objects/Instances, Methods, Scopes and Namespaces, Data hiding, Inheritance, Overloading, Overriding Integrators and Generators, Data class, Exception Handling: Anatomy of Exception, some useful Exceptions, except clause, try finally clause, User Define Exceptions.

UNIT-V **No. of Hours: 7**

File Handling: File, Types of Files, and Operations on Files, Pickle: Pickling and Unpicking, Regular Expression Python Libraries, Introduction to NumPy, arrays, and matrix, operations on arrays and matrix.

Text Books:

1. Think Python Second Edition, by Allen B. Downey.
2. Learning Python Fifth Edition, By Mark Lutz.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition on, Green Tea Press, 2015, ISBN: 978-9352134755.
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-81

Online Resources:

1. https://onlinecourses.nptel.ac.in/Python /preview
2. http://nptelvideos.com/video.python?id=916

CS-4224: PYTHON PROGRAMMING-PRACTICAL

Course Outcomes (COs):

CO1: Identify and perform operations on various data types (e.g. numeric, strings, lists, tuples, dictionaries, sets).

CO2: Develop skill to solve real-world problems using functions, lists, and tuples.

CO3: Ability to create and work with immutable sets using the frozen set.

CO4: Handle complex problems using oops in python programming.

CO5: Ability to perform scientific computing and data analysis Python Libraries.

Course Contents

UNIT-I **No. of Hours: 8**

Basic

1. Write a python program to calculate area of circle.
2. Write a python program to input two variable and print addition, subtraction, Multiplication and division.
3. Write a python program to input three numbers and display greatest number.
4. Write a python program to input marks of 5 subjects and display total, percentage, Result and Grade. If student is fail (<35) in any subject then display fail.
5. Write a python program to check if a number is odd or even.
6. Write a python program to find sum of first n natural numbers.
7. Write a python program to check whether a given number is prime or not
8. Write a python program to check whether the given number is an armstrong number or not.
9. Write a python program to find fibonacci series upto n (upto a given range).

String

10. Write a python program to assign a multiline string to a variable by using three quotes.
11. Write a python program to print length of a string.
12. Write a python program to perform slicing operations on strings.
13. Write a python program to convert any string in upper and lower case.
14. Write a python program to removes any whitespace from the beginning or the end.
15. Write a python program to concatenate two strings.
16. Write a python program to implement built-in methods of string.

UNIT-II **No. of Hours: 8**

Loops and Patterns

17. Write a python program to demonstrate various loops in python programming.
18. Write a python program to print following pattern

```
*
* *
* * *
```

* * * *

19. Write a python program to print following pattern

D C B A

C B A

B A

A

20. Write a python program to print following pattern

A

B A

C B A

D C B A

Function

21. Write a python program to display rollno, name, course and aadhar no of student using function.

22. Write a python programto multiply all the numbers in a list using function

23. Write a python programto check whether a number falls within a given range using function.

24. Write a pythonprogram to check whether a string is a pangram or not using function.

25. Write a python program to create and print a list where the values are the squares of numbers between 1 and 20 using function.

26. Write a python program to access a function inside a function.

UNIT-III **No. of Hours: 8**

List

27. Write a python programto find the smallest and the largest list elements on in list.

28. Write a python programto split a list in half and store the elements in two different lists

29. Write a python programto remove multiple empty strings from a list of strings.

30. Write a python program to interchange first and last elements of in a list.

31. Write a python program to find all possible combinations of a list with four elements.

32. Write a python program toprint square of each element of the list and print list in reverse order.

33. Write a python program toremove negative values from a list with filter () function.

Tuples

34. Write a python program to create a tuple with different data types.

35. Write a python program to create a tuple with single item 500.

36. Write a python program to unpack the tuple into 5 variables.

37. Write a python program to swap two tuples in python.

38. Write a python program to sort a tuple of tuples by 2nd item.

39. Write a python program to check if all items in the tuple are the same.

40. Write a pythonprogram to modify the first item (55) of a list inside a tuple to 5555.

UNIT-IV **No. of Hours: 8**

Set and Dictionary

41. Write a python program to add a list of elements to a set.
42. Write a python program to return a new set of identical items from two sets.
43. Write a python program to get only unique items from two sets.
44. Write a python program to update the first set with items that don't exist in the second set.
45. Write a python program to checkif two sets have any elements in common. If yes, display the common elements.
46. Write a python program that uses frozensets.
47. Write a Python program to sort a dictionary by value.
48. Write a Python program to convert two lists into a dictionary.
49. Write a Python program to merge two Python dictionaries into one.
50. Write a Python program to check if a value exists in a dictionary.

OOPS

51. Write a Python program to create a student class with Rollno, Name and contact attributes.
52. Write a Python program to create a child class Bus that will inherit all of the variables and methods.
53. Write a Python program to define a property that must have the same value for every class instance.
54. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.
55. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items, and calculating the total price.
56. Write a Python program to create a calculator class. Include methods for basic arithmetic operations.

UNIT-V **No. of Hours: 8**

File and Python Libraries

57. Write a python program to count number of lines in a file
58. Write a python program to search for a string in text files.
59. Write a python program toget file creation and modification datetime.
60. Write a python program to use Pandas DataFrame head, tail, at, iat.
61. Write a python program to use pandas to read CSV into DataFrame.
62. Write a python program to create pandas dataframe from python dictionary.
63. Write a python program to create a result array by adding two NumPy arrays. next, modify the result array by calculating the square of each element.
64. Write a python program to print max from axis 0 and min from axis 1 from 2-d array.

Text Books:

1. Think Python second Edition, by Allen B. Downey.
2. Learning Python Fifth Edition, By Mark Lutz.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist”, 2nd Edition on, Green Tea Press, 2015, ISBN: 978-9352134755
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-81

Online Resources:

1. https://onlinecourses.nptel.ac.in/Python /preview
2. http://nptelvideos.com/video.python?id=916

CS-4712: DATA SCIENCE

Course Outcomes (COs):

CO1: Understand the fundamental concept of Data Science.
CO2: Evaluate the Data Science techniques for application handling large data.
CO3: Demonstrate the various Data Science Algorithms used in Data.
CO4: Execute statistical analysis analyses with professional statistical software.
CO5: Apply data science concepts and methods to solve problem in real-world contexts.

Course Contents

UNIT-I **No. of Hours: 7**

Introduction: What Is Data Science, Meaning, Scope and significance, History of data Science, Evolution and Development of Data Science as Subject, Associated Fields, Types of Data: Numeric or Continuous and Categorical or Nominal, Data Science Process: Prior Knowledge, Data Preparation, Modelling, Application, Knowledge. Data Science Tasks: Types and overview with examples, Artificial intelligence and Machine Learning: Introduction, Examples, Applications and General overview.

UNIT-II **No. of Hours: 9**

Data Exploration: Objective, Datasets, Descriptive Statistics- Univariate Exploration: Measure of Central tendency- Mean, Median, Mode, Measure of Spread-Range, Deviation, Variance, Multivariate Exploration-Central Data Point, Correlation, Data Visualization: what is Data Visualisation, Importance, Example of data Visualisation in data Science, Effectiveness, Data Visualisation Process, Different Types of Visualisation- Area Map, Bar chart, Line chart, Tables, Graph, Gantt chart, Histogram, Pie chart, Tree Map, Scatter plot, Heat Map, Advantages and Disadvantages of Data Visualisation.

UNIT-III **No. of Hours: 9**

Classification: Definition, Purpose, Goals, Types, Problems, Applications, Algorithms-Decision Tree, K-Nearest Neighbours Algorithm, Support Vector Machine Regression Methods: What is Regression? Types-Linear Regression, Logistic Regression, Anomaly Detection: Concepts, Causes of Outliers, Anomaly Detection Techniques-Distance-Based Outlier Detection, Density- Based Outlier Detection, Local Outlier Factor.

UNIT-IV **No. of Hours: 8**

Time Series Forecasting: Understanding of Time Series Forecasting, Taxonomy of Time Series Forecasting, Components – Trends, Seasonality, Cyclic Pattern, Noise or irregularity, Real world Applications, Clustering: Clustering to Describe the Data, Types of Clustering Techniques. K- Means Clustering, DBSCAN Clustering.

UNIT-V **No. of Hours: 7**

Association Analysis: Concept, Association rules- Support, Confidence, Lift, Conviction, Algorithms- Apriori Algorithm, Frequent Pattern-Growth Algorithm, Eclat Algorithms, Applications, Recommendation Engines: Concept, Need, Applications, Types- Collaborative Filtering,Content-Based Filtering, Benefits and Drawbacks.

Text Books:

1. Vijay Kotu and Bala Deshpande, “Data Science: Concept and Practice”, Second Edition, Elsevier Science Publication , 2018
2. Joel Grus, “Data Science from Scratch”, Second Edition, O Reilly Media Publication, 2019

Reference Books:

1. Prasad, R. N., Acharya, S., “Introduction to Data Science: Practical Approach with R and Python”, First Edition, Wiley Publication, 2021
2. Dr Reema Thareja, “Data Science and Machine Learning using Python”, McGraw Hill Publication 2022

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs69
2. https://onlinecourses.nptel.ac.in/noc25_cs60