FIRST-YEAR OF BACHELOR OF COMPUTER SCIENCE MAJOR REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: DATA STRUCTURE

SEMESTER-II, W.E.F. 2023-2024

Recommended by the Board of Studies in Computer Science
And
Approved by the Academic Council

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: _____

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Computer Science
Name of the Class	:	First Year
Semester	:	Second
No. of Credits	:	02
Title of the Course	:	Data Structure
Course Code	:	S104CST
Name of the Vertical in adherence to NEP 2020	:	Major and Minor
Eligibility for Admission	:	Any 12th Pass seeking Admission to Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	UG
Pattern of Marks Distribution for TE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2023-2024
Ordinances /Regulations (if any)		

Syllabus for First Year of Bachelor of Science in Computer Science

(With effect from the academic year 2023-2024)

SEMESTER-II **Paper No.– 2**

Course Title: Data Structure **No. of Credits - 02**

Type of Vertical: Major and Minor **COURSE CODE: S105CST**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…

Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	Learn about Data structures, its types and significance in computing
CLO-02	Understand	Explore about Abstract Data types and its implementation
CLO-03	Analyse	Ability to program various applications using different data structure in Python

Syllabus for First Year of Bachelor of Science in Computer Science

(With effect from the academic year 2023-2024)

SEMESTER-II **Paper No.– 2**

Course Title: Data Structure **No. of Credits - 02**

Type of Vertical: Major and Minor **COURSE CODE: S105CST**

COURSE CONTENT			
Module No.	**Content**	**Credits**	**No. of Lectures**
1	**Abstract Data Types**: Introduction, The Date Abstract Data Type, Bags, Iterators. Application **Arrays**: Array Structure, Python List, Two Dimensional Arrays, Matrix Abstract Data Type, Application **Sets and Maps**: Sets-Set ADT, Selecting Data Structure, List based Implementation, Maps-Map ADT, List Based Implementation, Multi-Dimensional Arrays-Multi-Array ADT, Implementing Multiarrays, Application **Algorithm Analysis:** Complexity Analysis-Big-O Notation, Evaluating Python Code, Evaluating Python List, Amortized Cost, Evaluating Set ADT, Application Searching and Sorting: Searching-Linear Search, Binary Search, Sorting-Bubble, Selection and Insertion Sort, Working with Sorted Lists-Maintaining Sorted List, Maintaining sorted List Linked Structures: Introduction Singly Linked List-Traversing, Searching, Prepending and Removing Nodes, Bag ADT-Linked List Implementation. Comparing Implementations, Linked List Iterators, More Ways to Build Linked Lists, ApplicationsPolynomials Stacks: Stack ADT, Implementing Stacks-Using Python List,Using Linked List, Stack Applications-Balanced Delimiters, Evaluating Postfix Expressions	**1**	**15**
	Queues: Queue ADT, Implementing Queue-Using Python List, Circular Array, Using List, Priority Queues- Priority Queue ADT, Bounded and unbounded Priority Queues Advanced Linked List: Doubly Linked Lists-Organization and Operation, Circular Linked List-Organization and Operation, Multi ListsRecursion: Recursive Functions, Properties of Recursion, Its working, Recursive Applications		

2	Hash Table: Introduction, Hashing-Linear Probing, Clustering, Rehashing, Separate Chaining, Hash Functions Advanced Sorting: Merge Sort, Quick Sort, Radix Sort, Sorting Linked List Binary Trees: Tree Structure, Binary Tree-Properties, Implementation and Traversals, Expression Trees, Heaps and Heapsort, Search Trees	**1**	**15**
	Total	**2**	**30**

Required Previous Knowledge

Students should know basic concepts related to computer and computer handling

Access to the Course

The course is available for all the students admitted for Bachelor of Science (Computer Scienece).

Forms of Assessment

The assessment of the course will be of Formative and Summative type. At the beginning of the course diagnostic assessment will be carried out. The formative assessment will be used for the Continuous Internal Evaluation whereas the summative assessment will be conducted at the end of the term. The weightage for formative and summative assessment will be 60:40. The detailed pattern is as given below.

Semester End Evaluation (60 Marks)
Question Paper Pattern
Time: 2 hours

Question No.	Unit/s	Question Pattern	Marks
Q.1	I	Descriptive Questions (Any 3 out of 6)	15
Q.2	II	Descriptive Questions (Any 3 out of 6)	15
	Total		**30**

Internal evaluation (40 Marks)

Sr. No.	Description	Marks
1	Two Classroom Tests	10
2	Project/ Viva/ Presentations/ Assignments	05
3	Attendance	05
	Total	**20**

Grading Scale

10 points grading scale will be used. The grading scale used is O to F. Grade O is the highest passing grade on the grading scale, and grade F is a fail. The Board of Examinations of the college reserves the right to change the grading scale.

Reference book:

- Data Structure and algorithm Using Python, Rance D. Necaise, 2016 Wiley India Edition
- Data Structure and Algorithm in Python, Michael T. Goodrich, Robertom Tamassia, M. H. Goldwasser, 2016 Wiley India Edition

Text book:

- Techmax publication book

Additional References:

- Data Structure and Algorithmic Thinking with Python- Narasimha Karumanchi, 2015, Careermonk Publications
- Fundamentals of Python: Data Structures, Kenneth Lambert, Delmar Cengage Learning