REVISED SYLLABUS ACCORDING TO CBCS NEP2020 SECOND-YEAR OF MASTER OF SCIENCE IN PHYSICS

COURSE TITLE:- Lab – 01 (MAJOR PRACTICAL)
SEMESTER - III
W.E.F. 2024 - 2025

RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
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.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: **dated 19 April 2024**

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Physics
Name of the Class	:	Second Year
Semester	:	Third
No. of Credits	:	04
Title of the Course	:	Lab – 01 (Major Practical)
Course Code	:	S604PHP
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Second year of M.Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra.
Passing Marks	:	100%
Mode of Assessment	:	Summative
Level	:	PG
Pattern of Marks Distribution	:	100% Semester End Examination
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024 - 2025

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - III **Paper – Physics Paper – IV**

Course Title: Lab Course – 01 **No. of Credits - 04**

Type of Vertical: Major **COURSE CODE: S604PHP**

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	Apply	Write C programme to manipulate Linked List, Stack and Queues
CLO-02	Apply	Write C programme to implement Binary search Tree, Heap and hash tables
CLO-03	Apply	Write C programme to implement Priority queues, circular buffers
CLO-04	Apply	Write C programme to implement sorting techniques like Bubble sort, quick sort and merge sort

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - III **Paper – Physics Paper – IV**

Course Title: Lab Course – 01 **No. of Credits - 04**

Type of Vertical: Major **COURSE CODE: S604PHP**

COURSE CONTENT

List of Practicals – Embedded C Programming

1. Linked List Operations:
   Implement basic operations on a singly linked list:
   - Insertion at the beginning/end/middle
   - Deletion of a node
   - Search for a given value
   - Display the list

2. Stack using Array:
   Implement a stack data structure using an array with the following operations:
   - Push
   - Pop
   - Peek
   - Check if stack is empty/full

3. Queue using Linked List:
   Implement a queue data structure using a linked list with the following operations:
   - Enqueue
   - Dequeue
   - Peek
   - Check if queue is empty/full

4. Binary Search Tree Operations:
   Implement basic operations on a binary search tree:
   - Insertion
   - Deletion
   - Searching for a key
   - Inorder, preorder, and postorder traversal

5. Heap Operations:
   Implement a binary heap with the following operations:
   - Insertion
   - Deletion (heapify down)
   - Extract maximum (or minimum for min heap)
   - Heapify (build heap from an array)

6. Hash Table Implementation:
   Implement a hash table with collision resolution using chaining and perform operations like:
   - Insertion
   - Deletion
   - Search
   - Resize

7. Tree Implementation:
   Implement a tree data structure and perform operations like:
   - Insertion
   - Deletion
   - Searching for a prefix

8. Priority Queue using Heap:
   Implement a priority queue using a binary heap with operations like:
   - Insertion with priority
   - Deletion of highest priority element
   - Peek highest priority element

9. Circular Buffer Implementation:
   Implement a circular buffer (also known as a circular queue) using an array with the following operations:
   - Enqueue
   - Dequeue
   - Peek
   - Check if buffer is empty/full

10. Bubble Sort:
    Implement the bubble sort algorithm to sort an array of integers in ascending order. Ensure your implementation handles swapping elements efficiently and terminates early if the array becomes sorted before completing all iterations.

11. Quick Sort:
    Implement the quick sort algorithm to sort an array of integers in ascending order. Ensure your implementation includes partitioning the array and recursively sorting subarrays. Also, consider implementing optimizations like choosing a good pivot element (e.g., median-of-three) to improve performance.

12. Merge Sort:
    Implement the merge sort algorithm to sort an array of integers in ascending order. Ensure your implementation correctly divides the array into halves; recursively sorts them, and merges them back together in sorted order.

Note:- Environment Setup, hands-on vi editor/ GIT and GCC toolchain shall be completed during the lectures and practiced by the students beforehand. This course shall not have separate practical sessions for it. The requirement for doing the practical is to have everything setup.

References Books:

1. Data Structures Using C by E. Balgurusamy

Access to the Course

The course is available for all the students admitted for Master of Science in Physics.

Methods of Assessment

The assessment pattern would be 100% Semester End Examination (SEE). The structure of the SEE would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.