Anekant Education Society's

Tuljaram Chaturchand College of Arts, Sci. & Commerce, Baramati

(Autonmous)

Department of Computer Science

S.Y.B.Sc.(Computer Science)
(Semester – III)

Syllabus
(2022 Pattern)

W.e.f. Academic Year 2023-2024

Subject: Computer Science

S.Y.B.Sc.(C.S.) Semester – III

(2019 Pattern)		**(2022 Pattern)**	
Paper Code	**Paper Title**	**Paper Code**	**Paper Title**
CSCO 2101	Data Structure using C	UCSCO211	Data Structure using C
CSCO 2102	Introduction to Web Technology	UCSCO212	Introduction to Web Technology
CSCO 2103	Lab. Course I : based on UCSCO2101	UCSCO213	Lab. Course I : based on UCSCO211
CSCO 2104	Lab. Course II : based on UCSCO2102	UCSCO214	Lab. Course II : based on UCSCO212

Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science
Paper Code : UCSCO211
Title of Paper: Data Structures using C
Paper : I
Credit : 3 (4 Lectures/Week)
No. of lectures : 60

Objective:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement the different data structures and implement solutions for specific problems

Prerequisites:

Knowledge of C Programming Language

Learning Outcomes:

Students will implement different types of algorithms and its comparisons.
Also implement different data structures.

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1. Introduction to data structures **[2]**

1.1 Concept
1.2 Data
    1.2.1 Data Type
    1.2.2 Data Object
    1.2.3 ADT -Definition, Operation, examples on rational number
1.3 Need of Data Structure
1.4 Types of Data Structure

2. Algorithm analysis **[3]**

2.1 Algorithm – definition, characteristics
2.2 Space complexity, time complexity
2.3 Asymptotic notation (Big O, Omega Ω, Theta Notation Θ)

3. Linear Data Structures **[7]**

3.1 Introduction to Arrays - array representation
3.2 Sorting algorithms with efficiency - Bubble sort, Insertion sort, Merge sort, Quick Sort
3.3 Searching techniques –Linear Search, Binary search

4. Linked List **[10]**

4.1 Introduction to Linked List
4.2 Implementation of Linked List – Static & Dynamic representation,
4.3 Types of Linked List - Singly , Doubly, Circular
4.4 Operations on Linked List - create, display, insert, delete, reverse, search, sort, concatenate & merge
4.5 Applications of Linked List – Polynomial Manipulation
4.6 Generalized linked list – Concept and Representation

5. Stacks **[6]**

5.1 Introduction
5.2 Representation - Static & Dynamic
5.3 Operations – Create, Init, Push , Pop & Display
5.4 Application - infix to postfix, infix to prefix, Evaluation of Expression
5.5 Simulating recursion using stack

6. Queues **[4]**

6.1 Introduction
6.2 Representation - Static & Dynamic
6.3 Operations – Create , Init , Insert , Remove & Display
6.4 Circular queue, priority queue (with implementation)
6.5 Concept of doubly ended queue (Dequeue)

7. Trees

[12]

7.1 Concept & Terminologies
7.2 Binary tree, binary search tree
7.3 Representation – Static and Dynamic
7.4 Operations on BST & Heap Tree – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, non recursive inorder traversal
7.5 Application - Heap sort
7.6 Height balanced tree- AVL trees- Rotations, AVL tree examples.

8. Graph **[4]**

8.1 Graph Terminology: Definition,
8.2 Traversals – BFS and DFS
8.3 Spanning Tree
8.4 Applications – AOV network – topological sort, AOE network – critical path

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Note: 48 hours for theory lectures and 12 hours for internal assessment and learning.

References:

T1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
T2. Data Structures using C and C++ --- By YedidyahLangsam, Aaron M. Tenenbaum, Moshe J. Augenstein
T3. Introduction to Data Structures using C---By Ashok Kamthane
T4. Data Structures using C --- Bandopadhyay & Dey (Pearson)
T5. Data Structures using C ---By Sriv

Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science
Paper Code : UCSCO212
Title of Paper : Introduction to Web Technology
Paper : II
Credit : 3 (4 Lectures/Week)
No. of lectures : 60

Prerequisites:

- Basic knowledge of Computers and its concepts.

Learning Objectives:

- To understand different and current Web technologies.
- To keep pace with the rapidly changing landscape of web application development.
- To Design dynamic, interactive and elegant web pages.

Learning Outcome:

- Students will able to
  Design web pages using HTML5, CSS, JavaScript and Bootstrap.
  Design dynamic, interactive and elegant Web sites.

Unit	Title and Contents	No. of Lectures
Unit 1	**Basics of Web Design** **1.1** History of the Internet **1.2** World Wide Web Consortium (W3C) **1.3** Personal, Distributed and Client/Server Computing **1.4** Software Technologies **1.5** Client Server Architecture and its Types	02
Unit 2	**Introduction to HTML5** **2.1** Difference between HTML & HTML5 **2.2** HTML Document and Basic Structure **2.3** Working with HTML Text, Heading, Paragraph, Formatting, Styles **2.4** HTML Color, Hyperlink, Image **2.5** HTML Lists, Tables and I frames **2.6** Block Level Elements and Inline Elements	10
Unit 3	**Specific Elements of HTML5** **3.1** HTML Layout : Header & Footer, Navigation Section, Article & Aside **3.2** The Meter Element **3.3** Working with Multimedia **3.4** Working with Forms and controls	09

	3.5 Image Mapping **3.6** Web Storage: Local storage and session storage	
Unit 4	**Basics of CSS** **4.1** Introduction of CSS **4.2** CSS Rules and Selectors **4.3** Ways to add Selectors **4.4** CSS Color, Box Model, Fonts, Tables, Border, Background **4.5** CSS Margins, Padding, Height, Width, Outline, Text **4.6** CSS Links, Lists, Display, Forms	16
Unit 5	**JavaScript** **5.1** Introduction to JavaScript **5.2** JavaScript Basics – Data Types, Control Structure **5.3** JavaScript Functions **5.4** Working with events **5.5** JS Popup boxes **5.6** JavaScript Objects	06
Unit 6	**Basics of Bootstrap** **6.1** Introduction to Bootstrap **6.2** Use and Advantages of Bootstrap **6.3** How to get Bootstrap **6.4** Bootstrap Containers, Grids, Carousel, Navbar **6.5** Bootstrap Forms, Radio Button, Checkbox, Dropdowns	05

Note: 48 hours for theory lectures and 12 hours for internal assessment and learning.

References:

1. Html & CSS: The Complete Reference, Fifth Edition by Thomas A. Powell and published by McGraw Hill.
2. HTML 5 in simple steps by Kogent Learning Solutions Inc., Publisher Dreamtech Press
3. Head First HTML with CSS & XHTML Book by Elisabeth Freeman and Eric Freeman.
4. The Essential Guide to CSS and HTML Web Design Book by Craig Grannell.
5. JavaScript: The Definitive Guide, Publisher – O'Reilly
6. JavaScript & JQuery: Interactive Front-End Web Development, Publisher – Wiley
7. Bootstrap 5 Foundations, by Daniel Foreman
8. Bootstrap, by Jake Spurlock, Publisher(s): O'Reilly Media, Inc.

Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science **Paper Code** : UCSCO213

Title of Paper: Lab Course-I Based on UCSCO211 **Paper** : III

Credit : 3 (4 Lectures/Week) **No. of Practical's :** 13

Learning Objectives:

1. To learn the systematic way of solving problem
2. To efficiently implement the different data structures and implement solutions for specific problems

Prerequisites:

Knowledge of C Programming Language

Learning Outcomes:

Students will develop different types of algorithms and its comparisons.
Also develop real life problems using different data structures.

- Assignment 1 – Sorting Algorithms
  - ✓ Bubble Sort
  - ✓ Insertion Sort
  - ✓ Quick Sort
  - ✓ Merger Sort

- Assignment 2 - Recursive Sorting Algorithms
  - ✓ Quick sort,
  - ✓ Merge Sort

- Assignment 3 - Searching Method
  - ✓ Linear search,
  - ✓ Binary search

- Assignment 4 Linked List –
  - ✓ Dynamic Implementation of Singly Linked List
  - ✓ Dynamic Implementation of Doubly Linked List
  - ✓ Dynamic Implementation of Circular Linked List.

- Assignment 5 - Stack
  - ✓ Static Stack Implementation
  - ✓ Dynamic Stack Implementation

- Assignment 6 Queue
  - ✓ Static and Dynamic Implementation
  - ✓ Linear Queue,
  - ✓ Circular queue

- Assignment 7 Tree –
  - ✓ Binary Search Tree Traversal: Create, add, delete, and display nodes.
- Assignment 8 Graph –
  - ✓ Adjacency matrix to adjacency list conversion, in degree, out degree

Class: S.Y. B. Sc.(Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science **Paper Code** : UCSCO214
Title of Paper : Lab Course-II: based On UCSCO212 **Paper** : IV
Credit : 2 (3 Hour Practical/Week/batch) **No. of Practical :** 13

Learning Objectives:

- To understand different Web technologies.
- To keep pace with the rapidly changing landscape of web application development.
- To Design dynamic, interactive and elegant web pages.

Learning Outcome:

- Students will apply technologies like HTML5, CSS, JavaScript and Bootstrap.
- Apply Web technologies to design dynamic, interactive and elegant Web Sites

Assignments on Introduction to Web Technology Using (HTML5, CSS, JavaScript and Bootstrap)	
Sr. No.	**Assignment Name**
1	Be acquainted with elements, Tags and advanced text formatting.
2	Practical implementation of all kinds of List in HTML5.
3	Practical implementation of all kinds of Tables in HTML5.
4	Designing of webpage with the help of iframes.
5	Practical implementation of Forms and all its controls.
6	Practical implementation of the Image Mapping.
7	Designing and Implementation of CSS for Lists and Tables.
8	Practice the use of multimedia components in HTML documents.
9	Practical implementation of all JavaScript concepts.
10	Designing beautiful web pages by using Bootstrap.