Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Department of Computer Science

Syllabus for
B.Sc.-I (Computer Science)
CBCS Pattern
w.e.f. 2017-18

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
BoS in Computer Science

1. Title of the Program: **B. Sc. (Computer Science)**

2. Introduction:

In the first year of under-graduation basic foundation of computer science is required for software development is laid. Fundamentals of computer and Basics of computer programming are introduced in first semester. The programming skills are further strengthened by a course in Programming in C language and Data Structures are introduced in second semester. These courses provide the preliminary skill set for understand the basic concepts of computer science and solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. In the second year of under-graduation: Operating System and Computer Networks are introduced as core subjects in third semester. The programming skills are further strengthened by a course in Object Oriented Programming using JAVA in fourth semester and Digital Electronics and Microprocessor is also introduced. Simultaneously two practical courses are designed to supplement the theoretical training.

At third year of under-graduation: Two theory course in each semester, among of them one is compulsory and we given discipline specific elective for other course and practical courses covers the entire topics necessary for building the knowledge base for graduate with one optional subject computer science.

Students can take project in computer science which gives them hands on experience in solving a problem and developing software.

3. Objectives of the Program:

Our objectives state what a graduate with an optional Subject as Computer Science is expected to achieve after completion of graduation.

1. To develop problem solving abilities using a computer
2. To build the necessary skills abilities for developing computer-based solutions for realproblems.
3. To take in quality software development practices.
4. To prepare necessary knowledge base for research and development in computer Science
5. To help students build-up a successful career in Computer Science

4. Program Specific Outcomes:
1 Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
2. Ability to link knowledge of computer science with other two chosen auxiliary disciplines of study.
3. Ability to present result using different presentation tools.
4. Ability to pursue higher studies of specification and to take up technical employment.
5. Display the knowledge of appropriate theory, practices and tools for the specification, design, and implementation
6. Display ethical code of conduct in usage of internet and Cyber System.
7. Ability to operate, manages, deploy, configure computer network, hardware, software operation of an organization.

5. Duration of the Program: Three years
6. Eligibility of the Program: **For B.Sc. I :**12th Science with Mathematics
7. Strength of the Students: 20
8. Fees for Course: As per UGC/University/College rules.
9. Period of the Course: As per UGC/University/College rules
10. List of book recommended: Included in syllabus
11. List of Laboratory Equipments,
    Instruments, Measurements etc: Software's as per the requirements of syllabus.
12. Medium of the language: English
13. Structure of the Program: Attached as Annexure 'A'
14. Allotment of workload
    (Theory/Practical):   Attached as Annexure 'A'
15. Intake capacity of students: As per UGC/University/College rules
16. Course duration: Each theory course is of 45 Contact hours
17. To be introduced from: **B.Sc. I (CBCS) from June 2017**

                         Chairman Board of Studies
                           Computer Science
                         (Dr. R. R. Londhe)

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Department of Computer Science
B. Sc. I (Computer Science) Semester I
Curriculum Structure with effect from June, 2017
Academic Year 2021-22

Course Code	Core Course	Title of the course withpaper number	Hours/ Week	Marks (50)		Credits
				Internal	End Semester	
U-COS-141	CCCOS-1 Section –A	Paper-I Fundamentals of Computer	03	20	30	02
U-COS-142	CCCOS-1 Section –B	Paper-II Basics of Computer Programming	03	20	30	02
U-COS-143	CCCOSP-1	Laboratory Course -I	03	20	30	01
		Total Credits				05

Student Stay Hours: 9/Week

B. Sc. I (Computer Science) Semester II

Course Code	Core Course	Title of the course withpaper number	Hours/ Week	Marks (50)		Credits
				Internal	End Semester	
U-COS-242	CCCOS-2 Section –A	Paper-III Programming in C	03	20	30	02
U-COS-243	CCCOS-2 Section –B	Paper-IV Data Structure	03	20	30	02
U-COS-244	CCCOSP-2	Laboratory Course-II	03	20	30	01
		Total Credits				05

Student Stay Hours: 9/Week

B. Sc. – I [Computer Science] Semester I
Course: Fundamentals of Computer
Course Code: U-COS-141 CCCOS-1
Paper-I (A)

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To understand the basics of computer system, its architecture, software and Networks.
- To understand the basic concepts, terminology of IT and familiar with the use of IT tools.
- Adequately explain functioning of computer components.
- Student will develop a vocabulary of key terms related to the computer and to software program
- Explain role of operating system in computer system and applications of computer networks.

Course Outcomes:
After successful completion of this course students should be able to –
- Identify the components of a personal computer system
- Demonstrate input/output unit functions
- Demonstrate window and menu commands and how they are used
- Demonstrate how to organize files and documents on a USB/hard drive Student will be able to compose, format and edit a word document
- Use internet for navigate and search the information and communicate with the people.

UNIT I: Introduction to Computers and Data Representation   [13 hrs]
Introduction
Basic structure, ALU, Memory, CPU, I/O devices
Generations of computer, Evolution of computer
Classification of computers: Notebook computers, personal computers, Workstation, micro, mini, mainframe, super computers, Computer Codes.
Introduction to number system: Decimal, Binary, Octal, Hexadecimal.
Conversions: Binary Arithmetic, Floating point numbers.

UNIT II: Input / Output Devices and Memory   [10 hrs]
Input Devices: Keyboard, Point & Draw Devices,
Data Scanning Devices, Digitizer, Electronic Card Reader, Voice Recognition Devices.
Output Devices: Monitor, Printer, Plotter, Screen Image Projector, Voice Response System.
Memory: RAM, ROM, PROM, EPROM, EEPROM
Base Memory, Extended Memory, Expanded Memory, Cache Memory
Storage Devices: Tape, FDD, HDD, CD ROM

UNIT III: Computer Software and Introduction to OOPs   **[12 hrs]**

Definition of Software, Types of Software, Operating System
Main function of operating system, Files and Directories, Types of OS
Introduction to DOS, Introduction to Windows, Structured Programming,
What is OOPs? Basics of OOPs

UNIT IV: Computer Networks and Introduction to Internet   **[10 hrs]**

Definition of computer network
Network types: LAN, MAN and WAN
Network Topologies: Star, Ring, Hybrid Network
Wireless Networks, Different Search Tools, Web Browsers, Definition, Uses of
Internet
Basic Services: Electronic mail, File Transfer Protocol, Telnet

Reference Books:

1. Fundamentals of Computers By V. Rajaraman
2. Computers and Common Sense By R. Hunt and Shelly Y.
3. Computer Fundamentals (5Th Edition) By P. K. Sinha

B. Sc. – I [Computer Science] Semester I
Course: Basics of Computer Programming
Course Code: U-COS-142
CCCOS-1 (B)
Paper-II

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To develop Problem Solving abilities using computers
- To teach basic principles of programming Languages
- To develop skills for writing simple programs using 'C'
- To gain experience about structured programming
- To help students to understand the implementation of C language

Course Outcomes:
After successful completion of this course, students should be able to –
- Design an algorithmic solution for a given problem.
- Draw flowcharts for the solution.
- Write a maintainable C program for a given algorithm.
- Write well documented and indented program according to coding standards.
- Execute the C program.

UNIT- I Algorithm and Flowchart   [10 hrs]
Algorithm – Definition, Characteristics, Space Complexity, Time Complexity Problem Solving and Write A Simple Algorithm, Flow Chart and Its Symbol Problem Solving With Flowchart, Computer Languages.

UNIT- II Introduction to 'C' Programming   [12 hrs]
History, Compilers and Interpreters, Keywords, Identifiers, Variables
Constants – Character, Integer, Float, String, Escape Sequences
Data Types – Built-In And User Defined
Operators And Expressions, Operator Types (Arithmetic, Relational, Logical, Assignment, Bitwise, Conditional, Other Operators), Simple Programs Using Printf( ) And Scanf( )

UNIT- III Selection And Control Structures   [13 hrs]

Selection Statements: If Statement, If _ Else Statement , Conditional / Ternary Operator Statement (? :), Switch Statement.
Loop Control Structures: While, Do-While, For, Nested Structures Break And Continue

UNIT- IV Searching And Sorting Techniques   [10 hrs]

Linear Search
Binary Search
Bubble Sort
Insertion Sort
Selection Sort

References:

1. The C Programming Language, Brian W. Kernighan,
 Dennis M. Ritchie, PHI Learning

2. Programming in ANSI C, E. Balaguruswamy, TataMc- Graw Hill
    Publishing Co.Ltd.-New Delhi

B. Sc. – I [Computer Science] Semester I
Course: Laboratory Course -I
Course Code: U-COS-143
CCCOSP-1

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To learn the working knowledge of hardware and software of computer.
- To learn the basic concepts of DOS Operating System.
- To learn the various features of MS-Office.
- To write and execute the simple programs in 'C' language.
- To familiarize the students with the network devices and the internet.

Course Outcomes:
After successful completing of this course, students should be able to –
- Execute DOS commands and create batch file.
- Demonstrate how to organize files and documents on a USB/hard drive.
- Compose, format and edit a word document
- Write and execute simple programs in 'C' language
- Send email messages and navigate and search through the internet and use Google drive

Practical List
1. Introduction to DOS (Booting Process, Use of basic commands like date, time, dir, copy con, type, ren etc.)
2. Creating a directory structure in DOS (Using commands md, cd, rd, copy) and creation of batch file.
3. Introduction to Windows Operating System (File operations using windows explorer, Internet explorer, desktop related operations etc.)
4. Introduction to MS –Word.
5. Introduction to MS- Power Point.
6. Introduction MS-Excel.
7. Practical on use of Internet and Google drive.
8. Write an algorithm and draw flowchart to check whether given number is positive or negative and implement it.
9. Write an algorithm and draw a flowchart to print A to Z and implement it.
10. Write an algorithm and Flowchart to print 10, 9, ... , 1 and implement it.
11. Programs to demonstrate decision making statements (if and if-else, nested structures, switch case)
12. Program to demonstrate use of simple loops.
13. Program to demonstrate use of nested loop.
14. Programs for linear Search and Binary Search
15. Programs for Bubble Sort, Selection Sort, Insertion Sort

B. Sc. – I [Computer Science] Semester II
Course: Programming in C
Course Code: U-COS-242
CCCOS-2 (A)
Paper-III

Teaching Hours: 45   **Marks: 50**

Learning Objectives:

- To develop programming ability.
- To teach various concepts like Arrays, Functions, Structures, Unions of programming languages.
- To handle file management functions in C language.
- To develop logic to create the programs using 'C'.

Course Outcomes:

After successful completion of this course, students should be able to –

- Develop programs in C language.
- Write programs using arrays, functions, structure and unions.
- Write programs for file management.
- Apply own logic to develop programs in C language.

UNIT- I Basics Of C Language And Arrays   [10 hrs]

Control Statements, Looping Statements, Introduction To Array Declaration And Initialization Of Arrays, Accessing Array Elements,
Memory Representation Of Array, Arrays And Its Types, String Handling Functions.

UNIT- II Functions, Structure And Union   [12 hrs]

Introduction, Types of functions, Defining functions, Arguments Function prototype, Calling function, Returning function results
Call by value and call by reference, Recursion, Introduction to Structure
Declaration of structure, Accessing Structure Elements, How structure elements are stored? , Array of Structure, Introduction to Union, Declaration of Union
Accessing Union Elements, How union elements are stored.

UNIT- III Storage Classes And Pointers   [13 hrs]

Automatic storage class, Register storage class, Static storage class
External storage class, Introduction to Pointers, Pointer declaration, initialization
Dereferencing pointers, Pointer arithmetic, Pointer to pointer, Arrays and pointers.

UNIT- IV File Management In C   [10 hrs]

Defining and opening a file - closing file I/O operations on files
Error handling during I/O operations Random access to files
Command line arguments

References:
1. Programming In C By E. Balagurusamy, TMH Publications
2. Let Us C By Yashwant Kanetkar
3. The C Programming Language By Dennis Ritchie,

B. Sc. – I [Computer Science]
Semester II
Course: Data Structure
Course Code: U-COS-243
CCCOS-2 (B)
Paper-IV

Teaching Hours: 45   **Marks: 50**

Learning Objectives:

- To provide the students with solid foundations in the basic concepts of programming: data structures and algorithms.
- To understand basic computational concepts and elementary data structures
- To translate well-structured plans into working programs
- To analyze simple problems involving text and numbers

Course Outcomes:

After successful completing of this course, students should be able to –

- Students Know about the basic concepts of Function, Array and Link-list.
- Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
- Design new algorithms or modify existing ones for new applications and able to analyze the space and time efficiency of most algorithms.

UNIT- I Introduction to Data Structure And Arrays   [10 hrs]

Definition,

Classification of Data Structure: Primitive And Non Primitive.

Operations of Data Structures

Introduction To Arrays

Representation Of Array in Computers Memory Array Operations: Traversing, Insertion, Deletion

UNIT- II Linked List   [13 hrs]

Definition, Components Of Linked List,

Representation Of Linked List in Computers Memory Advantages And Disadvantages Of Linked List

Types Of Linked List: Singly Linked List, Doubly Linked List, Circular Linked List And Circular Doubly Linked List.

Operations On Singly Linked List: Creation, Insertion, Deletion, Search And Display

UNIT- III Stack And Queue   [12 hrs]

Stack

Definition Of Stack, Array Representation Of Stack Operations On Stack- PUSH And POP

Queue

Definition Of Queue, Types Of Queue: Simple Queue, Circular Queue, Double Ended Queue (Deque) Priority Queue, Operations On Queue-Insertion And Deletion, Tower Of Hanoi Problem.

UNIT- IV Tree And Graph   [10 hrs]

Definition: Tree, Binary tree, complete binary tree, Binary search tree,
Traversal Of Binary Tree: Preorder, Inorder And Postorder. Graphs - Terminology Representation Of Graph
Graph Traversals (DFS And BFS)

References:

1. Data Structure Using C By Yashwant Kanetkar , BPB Publication
2. Data Structures Using C By Tenenbaum
3. Data Structure By Seymour Lipschutz Outline Series
4. Data Structure and Algorithm By Aho, Pearson Publication

B. Sc. – I [Computer Science] Semester
II Course: Laboratory Course -II
Course Code: U-COS-244
CCCOSP-2

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- Know about the basic concepts of Function, Array and Link-list.
- Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
- Design new algorithms or modify existing ones for new applications and able to analyze the space & time efficiency of most algorithms.

Course Outcomes:
After successful completing of this course, students should be able to –
- Write programs using arrays, functions, structure and unions.
- Write programs for storage classes and file management
- To access how the choices of data structure and algorithm methods impact the performance of program.
- To solve problems based upon different data structure and also write programs.
- Choose an appropriate data structure for a particular problem.

Practical List
1. Write and execute a program to check the number is odd or even.
2. Write and execute a program to calculate the factorial of given number.
3. Write and execute a program to demonstrate one dimensional array.
4. Write and execute a program for addition of 2*2 matrix.
5. Write and execute a program for multiplication of 2*2 matrix .
6. Write and execute a program to demonstrate string handling functions
7. Write and execute a program to demonstrate Storage classes (All classes)
8. Write and execute a program to demonstrate Pointers.
9. Write and execute a program to demonstrate Functions (call by value and call by reference).
10. Write and execute a program to demonstrate Structure and Union.
11. Write and execute a program to demonstrate file opening and closing.
12. Write and execute a program to demonstrate command line arguments.
13. Write and execute a program to demonstrate stack operations.
14. Write and execute a program to demonstrate Queue operations.
15. Write and execute a program to implement linked list.