

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



Syllabus for  
B.Sc.-I (Computer Science)  
CBCS Pattern  
w.e.f. 2017-2018

# Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

## 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: Software Engineering 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 third semester and Linux Operating system is also introduced. Simultaneously two practical courses are designed to supplement the theoretical training.

At third year of under-graduation: Two theory papers in each semester and practical courses covers the entire topics necessary for building the knowledge base for graduate with one optional subject computer science.

One practical course also includes project work which gives students 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 real problems.
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. Advantages of the Program:** A graduate with optional subject Computer Science should:

Students will establish themselves as effective professionals by solving problems through the use of computer science knowledge. Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

**5. Duration of the Program:** Three years

**6. Eligibility of the Program: For B.Sc. I :** 12<sup>th</sup> Science with Mathematics

**7. Strength of the Students:** 20

**7. Fees for Course:** As per UGC/University/College rules.

**8. Period of the Course:** As per UGC/University/College rules

**9. Admission / Selection procedure:** As per UGC/University/College rules

**10. Teacher's qualifications:** As per UGC/University/College rules

**11. Standard of Passing:** As per UGC/University/College rules

**12. Nature of question paper with scheme of marking:** As per UGC/University/College rules

**13. List of book recommended:** Included in syllabus

**14. List of Laboratory Equipments, Instruments, Measurements etc.:** softwares as per the requirements of syllabus.

**15. Rules and regulations and ordinance**

**if any:** As per UGC/University/College rules

**16. Medium of the language:** English

**17. Structure of the Program:** Attached as Annexure 'A'

**18. Allotment of workload (Theory/Practical):** Attached as Annexure 'A'

**19. Staffing pattern:** As per UGC/University/College rules.

**20. Intake capacity of students:** As per UGC/University/College rules

**21. Paper duration:** Each theory paper is of 45 Contact hours

**22. To be introduced from:** **B.Sc. I (CBCS) from June 2017.**

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

### **List of BoS Members**

**1. Dr. N. L. Deshmukh**

Assistant professor  
School of Computational Studies  
SRTMU, Nanded

**2. Dr. Vikas Humbe**

Assistant professor,  
School of Technology,  
SRTMU, Sub center, Latur

**3. Mr. Rajesh Walse**

Assistant Professor, Pusad

**4. Mr. R. L. Bhanap**

Industry Nominee

**5. Mr. Ajit Sautaddekar**

Somero Software,  
Bangluru

**6. Prof. K. M. Pradhan**

RSM, Latur

**7. Prof. S. V. Patil**

RSM, Latur

**8. Prof. V. D. Panchal**

RSM, Latur

**9. Prof. M. A. Shinde**

RSM, Latur

**10. Prof. C. P. Ahale**

RSM, Latur

11. Prof. S. R. Sonwane  
RSM, Latur

12. Prof. R. S. S. Shaikh  
RSM, Latur

13. Prof. J. M. Jadhav  
RSM, Latur

14. Prof. S. K. Kasbe  
RSM, Latur

15. Prof. P. G. Joshi  
RSM, Latur

16. Prof. J. V. Mashalkar  
RSM, Latur

17. Prof. A. K. Shaikh  
RSM, Latur

**Annexure 'A'**  
**Rajarshi Shahu Mahavidyalaya, Latur (Autonomous)**  
**Department of Computer Science and IT**  
**B. Sc. I (Computer Science) Semester I**  
**Curriculum Structure with effect from June, 2017**

Course Code	Core Course	Title of the course with paper 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 with paper number	Hours/Week	Marks (50)		Credits
				Internal	End Semester	
U-COS-241	CCCOS-2 Section -A	Paper-III Programming in C	03	20	30	02
U-COS-242	CCCOS-2 Section -B	Paper-IV Data Structure	03	20	30	02
U-COS-243	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)**

**LEARNING OBJECTIVES:**

1. To understand the basics of computer system, its architecture, database and Networks.
2. To understand the basic concepts, terminology of IT and familiar with the use of IT tools.
3. Adequately explain functioning of computer components.
4. To Learn and explore new IT techniques in various applications
5. Student will develop a vocabulary of key terms related to the computer and to software program
6. Explain role of Operating system in computer system and applications of computer networks.

**COURSE OUTCOMES:**

1. Student will be able to identify the components of a personal computer system
2. Student will be able to demonstrate input/output functions
3. Student will be able to demonstrate window and menu commands and how they are used
4. Student will be able to demonstrate how to organize files and documents on a USB/hard drive  
Student will be able to compose, format and edit a word document
5. Student will be able to send email messages (with or without attachments)
6. Students will be able to navigate and search through the internet

**UNIT I: Introduction to Computers and Data Representation [13hrs]**

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 and conversions.

Binary Arithmetic, Floating point numbers.

**UNIT II: Input/Output Devices and Memory [10hrs]**

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  
What is OOPs?  
Basics of OOPs

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

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. Fundamentals of Computers By P. K. Sinha
4. MS-Dos 6.22- Russell A Stultz (BPB Publication)



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

**LEARNING OBJECTIVES:**

1. To develop Problem Solving abilities using computers
2. To teach basic principles of programming Languages
3. To develop skills for writing simple programs using 'C'
4. To gain experience about structured programming
5. To help students to understand the implementation of C language

**COURSE OUTCOMES:**

1. Students will be able to design an algorithmic solution for a given problem.
2. Students will be able to draw flowcharts for the solution.
3. Students will be able to write a maintainable C program for a given algorithm.
4. Students will be able to write well documented and indented program according to coding standards.
5. Students will be able to execute the C program.

**UNIT- I ALGORITHM AND FLOWCHART**

**[10hrs]**

Algorithm – definition, characteristics  
Space complexity, time complexity  
Problem solving and write a Simple Algorithm  
Flow chart and its symbol  
Problem solving with flow

**UNIT- II INTRODUCTION TO 'C' PROGRAMMING**

**[12hrs]**

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**

**[13hrs]**

Selection statements:

if 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**

**[10hrs]**

Linear Search

Binary Search

Bubble Sort

Selection Sort

Insertion Sort

### **References:**

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, PHI Learning
2. Programming in ANSI C, E. Balaguruswamy, Tata Mc-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**

**LEARNING OBJECTIVES:**

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

**COURSE OUTCOMES:**

1. Student will be able to execute DOS commands and create batch file.
2. Student will be able to demonstrate how to organize files and documents on a USB/hard drive.
3. Student will be able to compose, format and edit a word document
4. Student will be able to write and execute simple programs in 'C' language
5. Student will be able to send email messages and navigate and search through the internet

**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 Internet

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. Assignment to demonstrate decision making statements (if and if-else, nested structures, witch case)

12. Assignment to demonstrate use of simple loops.

13. Assignment 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-241**  
**CCCOS-2 (A)**  
**Paper-III**

**LEARNING OBJECTIVES:**

1. To develop Programming ability.
2. To teach various concepts like Arrays, Functions, Structures, Unions of programming languages.
3. To handle File Management functions in C language.
4. To develop the logic to create the programs using 'C'.

**COURSE OUTCOMES:**

1. Students will be able to develop programs in C language.
2. Students will be able to write programs using arrays, functions, structure and unions.
3. Students will be able to write programs for file management.
4. Students will be able to apply own logic to develop programs in c language.

**UNIT- I BASICS OF C LANGUAGE AND ARRAYS**

**[12hrs]**

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**

**[12hrs]**

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**

**[13hrs]**

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**

**[10hrs]**

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. E. Balaguruswamy, "Programming In C", TMH Publications
2. Yashwant Kanetkar, "Let Us C"
3. Dennis Ritchie, "The C Programming Language"

**B. Sc. – I [Computer Science] Semester II**  
**Course: Data Structure**  
**Course Code: U-COS-241**  
**CCOS-2 (B)**  
**Paper-IV**

## **DATA STRUCTURE**

### **LEARNING OBJECTIVES:**

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

### **COURSE OUTCOMES:**

1. Students Know about the basic concepts of Function, Array and Link-list.
2. Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
3. 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**

**[10hrs]**

Definition,  
Classification of data structure: primitive and non primitive.  
Operations of data structures  
Introduction of Array  
Representation of array in computers memory  
Array Operations:  
    Traversing  
    Insertion  
    Deletion

### **UNIT- II LINKED LIST**

**[13hrs]**

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**

**[12hrs]**

Definition of Stack

Array representation of stack

Operations on stack- PUSH and POP

Definition of Queue

Types of queue: Simple queue, circular queue, double ended queue (deque) priority queue

Operations on Queue-Insertion and Deletion

### **UNIT- IV TREE AND GRAPH**

**[10hrs]**

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 -Yashwant Kanetkar-BPB Publication
2. Data Structures Using C -Tennenbaum
3. Data Structure- Lipsctuz Schum Outline Series



**B. Sc. – I [Computer Science] Semester II**  
**Course: Laboratory Course -II**  
**Course Code: U-COS-242**  
**CCCOSP-2**

**LEARNING OBJECTIVES:**

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

**COURSE OUTCOMES:**

1. Students will be able to write programs using arrays, functions, structure and unions.
2. Students will be able to write programs for storage classes and file management.
3. To access how the choices of data structure and algorithm methods impact the performance of program.
4. To solve problems based upon different data structure and also write programs.
5. 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.