



**Rajarshi Shahu Mahavidyalaya  
(Autonomous), Latur**

**Syllabus  
(2022-23)**

**Under CBCS**

**Three Year Degree Program in Science**

**Department of Computer Science**

**UG First Year**

**Semester I & II**

**Syllabi Approved by the Board of Studies in  
Computer Science with effect from June, 2022**

# **Rajarshi Shahu Mahavidyalaya (Autonomous), Latur**

## **BoS in Computer Science**

- 1. Title of the Program: B. Sc.**
- 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 Python 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 four 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 have given discipline specific electives 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 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 student 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:** 12<sup>th</sup> Science with Mathematics
- 7. Strength of the Students:** 20
- 8. Fees for Course:** As per UGC/University/College rules.
- 9. Period of the Program:** As per UGC/University/College rules
- 10. List of books recommended:** Included in syllabus
- 11. List of Laboratory Equipment, 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 Contract hours
- 17. To be introduced from:** B.Sc. I (CBCS) from June 2022

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

## Annexure A

**Rajarshi Shahu Mahavidyalaya (Autonomous), Latur****Department of Computer Science****Curriculum Structure with effect from June, 2022****B. Sc. First Year****Semester I & II**

	Course Code	Course Title	Lectures		Marks		Credits
			Per week	Total	C.C.E.	E. S. E	
<b>Semester - I</b>	<b>Core Courses</b>						
	U-COS-141	Fundamentals of Computer (Paper I)	3	45	20	30	02
	U-COS-142	Basics of Computer Programming With C (Paper II)	3	45	20	30	02
	U-COS-143	Laboratory Course 1	3	45	20	30	01
		<b>Total</b>			<b>150</b>		<b>05</b>

Student Stay Hours :9/Week

	Course Code	Course Title	Lectures		Marks		Credits
			Per week	Total	C.C.E.	E.S.E	
<b>Semester - II</b>	<b>Core Courses</b>						
	U-COS-242	Introduction to Python Programming	3	45	20	30	02
	U-COS-243	Data Structure	3	45	20	30	02
	U-COS-244	Laboratory Course 2	3	45	20	30	01
		<b>Total</b>			<b>Total</b>		<b>05</b>

Student Stay Hours :9/Week

**Rajarshi Shahu Mahavidyalaya (Autonomous), Latur**

**Department of Computer Science**

**B.Sc. First Year Semester I**

**Course Title: Fundamentals of Computer (Paper I)**

**Course Code: U-COS-141**

**Credits: 2**

**Total Lectures: 45**

**Max. 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 completion of this course students will 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.

<b>Unit No</b>	<b>Contents</b>	<b>No of Lectures</b>
<b>UNIT I: Introduction to Computers and Data Representation</b>	Introduction, Basic structure, ALU, Memory, CPU, I/O devices, Generations of computer, Evolution of computer <b>Classification of computers:</b> Notebook computers, personal computers, Workstation, micro, mini, mainframe, super computers, Computer Codes. <b>Introduction to number system:</b> Decimal, Binary, Octal, Hexadecimal. Conversions: Binary Arithmetic, Floating point numbers.	13 Lectures
<b>UNIT II: Input / Output Devices and Memory</b>	<b>Input Devices:</b> 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. <b>Memory:</b> RAM, ROM, PROM, EPROM, EEPROM Base Memory, Extended Memory, Expanded Memory, Cache Memory <b>Storage Devices:</b> Tape, FDD, HDD, CD ROM	10 Lectures
<b>UNIT III: Computer Software and</b>	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,	12 Lectures

<b>Introduction to OOPs</b>	Computer Languages, Structured Programming, what is OOPs? Basics of OOPs	
<b>UNIT IV: Computer Networks and Introduction to Internet</b>	Definition of computer network Network types: LAN, MAN and WAN <b>Network Topologies:</b> Star, Ring, Hybrid Network Wireless Networks, Different Search Tools, Web Browsers, Definition, Uses of Internet <b>Basic Services:</b> Electronic mail, File Transfer Protocol, Telnet	10 Lectures

**REFERENCE BOOKS:**

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

**Rajarshi Shahu Mahavidyalaya (Autonomous), Latur**

**Department of Computer Science**

**B.Sc. First Year Semester I**

**Course Title: Basics of Computer Programming with C Language (Paper II)**

**Course Code: U-COS-142**

**Credits: 2**

**Total Lectures: 45**

**Max. 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 completion of this course students will 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.

<b>Unit No</b>	<b>Contents</b>	<b>No. of Lectures</b>
<b>UNIT- I Introduction to Programming</b>	Algorithm – Definition, Characteristics, Space Complexity, Time Complexity, Problem Solving and Writing Simple Algorithms, Flow Chart and Its Symbol, Problem Solving with Flowchart 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, Simple Programs Using printf () and scanf ()	12 Lectures
<b>UNIT- II Decision Control, Loop Control and Array Handling</b>	<b>Control Statements</b> , Looping Statements, Introduction to Array- Declaration and Initialization of Arrays, Accessing Array Elements, Memory Representation of Array, Arrays and Its Types, <b>String Handling Functions</b> .	10 Lectures
<b>UNIT- III Functions, Structure and Union</b>	Introduction, Types of functions, Defining functions, Arguments Function prototype, Calling function, Returning function results Call by value and call by reference, Recursion, <b>Introduction to Structure</b> - 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.	12 Lectures

<b>UNIT- IV Storage Classes, Pointers and File Management In C</b>	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.  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	11 Lectures
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**REFERENCE BOOKS:**

1. Let Us C- Yashwant Kanetkar (BPB Publication)
2. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, PHI Learning
3. Programming in ANSI C, E. Balaguruswamy, TataMc- Graw Hill Publishing Co.Ltd.-New Delhi
4. How To Solve It by Computer, R G Dromey (PHI Series In Computer Science)



**Rajarshi Shahu Mahavidyalaya (Autonomous), Latur**

**B.Sc. First Year Semester I**

**Course Title: Laboratory Course I**

**Course Code: U-COS-143**

**Credits: 1**

**Total Lectures: 45**

**Max. Marks: 50**

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**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 completion of this course students will 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. Practical on Simple Programs in C Language.
9. Program to understand Control Statements & Looping Statements
10. Program to understand Arrays in C language
11. Program to understand string handling
12. Program to understand Functions in C language
13. Program to understand Structure & Union in C language
14. Program to understand storage classes in C language
15. Program to understand pointers in C language
16. Programs to understand file handling & Command line arguments in C language.

# Rajarshi Shahu Mahavidyalaya (Autonomous), Latur

## B.Sc. First Year Semester II

### Course Title: Introduction to Python Programming (Paper III)

Course Code: U-COS-242

Credits: 2

Total Lectures: 45

Max. Marks: 50

#### Learning Objectives:

- To acquire programming skills in core Python.
- To be aware about the data types, looping structure
- To be able to know the use of string, lists, dictionary and tuples
- To learn the concepts of Exception handling and file handling
- To acquire Object Oriented Skills in Python
- To use Graphical User Interface for the application development.

#### Course Outcomes:

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

- Write python programs that use strings, lists, tuples and dictionaries
- Demonstrate the concepts of Object-Oriented Programming using python programs
- Write python programs that stores and manipulates data using file handling functions
- Develop Windows applications with Graphical User Interface.

Unit No	Contents	No. of Lectures
<b>UNIT I: Getting Started</b>	Introduction, History, important features, overview of python and installation, Lexical Matters: Lines, Comments, Names and Tokens, Doc Strings, Simple Program, Identifiers, Reserved Words, Multi-Line Statements, Operators, variables, assignment, Numbers (int, long, float and complex), Strings. Decision and Looping Statements, Introduction to decision statement, If Statement, if—else statement, if-elif-else statement. Introduction to Looping statement, while loop, for loop, nesting of loop, break, continue and pass statement.	11 Lectures
<b>UNIT II: Sequence: String, List, Tuples and Error, exception</b>	Strings, Strings and Operators, String Built-in methods, Lists, List type built-in method, Tuples, Special features of Tuples, Dictionary, what are exceptions? exceptions in Python, Detecting and handling exceptions, raising exception, Assertions, Standard exceptions, creating exceptions.	12 Lectures
<b>UNIT III: Functions, Class and OOPs</b>	What are functions? calling functions, creating functions, passing functions, formal arguments, positional arguments, default arguments, variable length argument, recursion, Introduction to OOP, Classes, Class attributes, Instances, Instance attribute, building and Method of invocation, Sub classing and derivation, Inheritance, Built-in functions for classes, instances and other objects privacy.	12 Lectures
<b>UNIT IV: Graphical Interfaces</b>	Graphical user interfaces, event-driven programming paradigm, tkinter module, creating simple GUI, button, labels,	10 Lectures

	entry, dialogs, widget attribute – sizes, fonts, color layouts, nested frames.	
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**Reference Book:**

1. Core Python Programming- Dr. R Nageswara Rao (Dreamtech Press)
2. Core Python Programming – Wesley J. Chun, Printice Hall PTR, First edition.
3. Learning To Program with Python - Richard L. Halterman.

**Rajarshi Shahu Mahavidyalaya (Autonomous), Latur**

**B.Sc. First Year Semester II**

**Course Title: Data Structure (Paper IV)**

**Course Code: U-COS-243**

**Credits: 2**

**Total Lectures: 45**

**Max. 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 completion of this course students will be able to:

- Implement Arrays and Link-list for representation of Data
- 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.

<b>Unit No</b>	<b>Contents</b>	<b>No. of Lect.</b>
<b>UNIT- I Introduction to Data Structure and Arrays</b>	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, Searching, Sorting	10 Lectures
<b>UNIT- II Linked List</b>	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	13 Lectures
<b>UNIT- III Stack and Queue</b>	<b>Stack</b> - Definition of Stack, Array Representation of Stack Operations on Stack- PUSH And POP <b>Queue</b> - Definition of Queue, Types of Queues: Simple Queue, Circular Queue, Double Ended Queue (Deque) Priority Queue, Operations on Queue-Insertion and Deletion, Tower of Hanoi Problem.	1 2 Lectures
<b>UNIT- IV Tree and Graph</b>	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)	10 Lectures

**REFERENCE BOOKS:**

1. Data Structure Using C, Yashwant Kanetkar , BPB Publication
2. Data Structures Using C, Tenenbaum
3. Data Structure, Seymour Lipschutz Outline Series

**Learning Objectives:**

- To understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.
- To design new algorithms or modify existing ones for new applications and able to analyze the space & time efficiency of most algorithms.
- To acquire programming skills & Object-Oriented Skills in Python
- To develop the skills to design applications with graphical user Interfaces in Python

**Course Outcomes:** After completion of this course students will be able to:

- To assess 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.
- Explain basic principles of Python programming language.
- Implement Object Oriented concepts.
- Implement GUI applications.

**Practical List**

1. Program to demonstrate Datatypes.
2. Program to demonstrate branching & Looping statement
3. Program to demonstrate Method & Functions.
  - a. String
  - b. List
  - c. Tuple
  - d. Dictionary
4. Program to demonstrate function
  - a. Scope of variable
  - b. Types of arguments
  - c. Recursive Function
5. Program to demonstrate class and object
  - a. Types of variables
  - b. Types of Methods
  - c. Constructor & Destructor
6. Program to demonstrate inheritance
  - a. Types of Inheritance
  - b. Method / Constructor Overriding
  - c. Super()
7. Program to demonstrate GUI
  - a. tkinter module

- b. root window
- 8. Program for traversing an array
- 9. Program for searching an element in an array
- 10. Program for sorting array elements
- 11. Program for inserting elements into an array
- 12. Program for stack implementation
- 13. Program for queue implementation
- 14. Program for Linked List