ABEDA INAMDAR SENIOR COLLEGE

PUNE

Three Year B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

S.Y.B.Sc. (Computer Science)

Choice Based Credit System Syllabus

To be implemented from Academic Year 2022-2023

Titles of Papers, Credit Allocation and Scheme of Evaluation

S. Y. B. Sc.(Computer Science)

Semester III (Total credits=22)

Course Type	**Paper Code**	**Paper title**	**Credits**		**Evaluation**		
			T	P	IE	CA	TOTAL
CC-IX	21SBCS231C	Python Programming	2	-	20	30	50
	21SBCS232C	Software Engineering	1	1	20	30	50
	21SBCS233C	Practical course based on Python Programming	-	2	20	30	50
CC-X*	21SBCS231M	Mathematics – I	2	-	20	30	50
	21SBCS232M	Mathematics – II	2	-	20	30	50
	21SBCS233M	Mathematics – III	-	2	20	30	50
CC-XI*	21SBCS231E	Electronics – I	2	-	20	30	50
	21SBCS232E	Electronics – II	2	-	20	30	50
	21SBCS233E	Electronics – III	-	2	20	30	50
AECC-I*	21SBAECHN23M	Health and Nutrition	2	-	20	30	50
AECC-II*	21SBCS231E	Language Communication – I	2	-	20	30	50

Semester IV (Total credits=22)

Course Type	Paper Code	Paper title	Credits		Evaluation		
			T	P	IE	CA	TOTAL
CC-XII	21SBCS241C	Data Structure using Python	2	-	20	30	50
	21SBCS242C	Operating System	1	1	20	30	50
	21SBCS243C	Practical Course Based on Data Structure using Python	-	2	20	30	50
CC-XIII*	21SBCS241M	Mathematics – I	2	-	20	30	50
	21SBCS242M	Mathematics – II	2	-	20	30	50
	21SBCS243M	Mathematics – III	-	2	20	30	50
CC-XIV*	21SBCS241E	Electronics – I	2	-	20	30	50
	21SBCS242E	Electronics – II	2	-	20	30	50
	21SBCS243E	Electronics – III	-	2	20	30	50
AECC-III*	21SBAECEV24M	Environmental Awareness	2	-	20	30	50
AECC-IV*	21SBCS241E	Language Communication – II	2	-	20	30	50

METHODS OF EVALUATION

The evaluation of students will be done on five parameters:

1. Continuous Internal Evaluation (CIE)
2. Mid Semester Examination
3. Mock Practical Examination, Viva Voce, Journal, Project Report
4. Semester End Theory Examination (Final)
5. Semester End Practical Examination (Final)

For Continuous Internal Evaluation (CIE), Evaluation will be done continuously. Internal assessment will be of **20** marks for a paper of 50 Marks. These 20 marks are divided as follows:

a) There will be compulsory Test on Demand MCQ Examination of **20** marks of each subject which would be converted into **5Marks.**

b) Two Class Tests 10 Marks Each. Converted to 5 Marks.

c) Mid Sem Exam of 20 Marks converted to 05Marks

d) Participation in two activities at department/ college level 05 Marks

e) In case of students failing to score under category (d), the attendance can be considered to give marks.

f) There will be a compulsory Mock Practical Examination, Viva Voce of subjects mentioned in for **20 Marks**.

g) The subject teacher needs to adopt anyone out of the following methods for internal assessment:

Table 7: Methods of Internal Assessment

Written exam	Quiz
Presentations	Projects
Assignments	Tutorials
Oral examination	Open Book Test and Others

1) DURATION OF SEMESTER END EXAMINATION (FINAL): Question papers will be set for Thirty Marks (One and Half Hour Duration) for Theory and Thirty Marks (Three and Half Hour) for Practical Examination.

Table 8: Criteria for Paper Setting of Internal Assessment and Semester End Examination

Knowledge	Understanding	Applications, Analysis, Problem Solving	Total Marks
50%	25%	25%	100%

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(CBCS-Autonomy 21 Pattern)

Course/ Paper Title	Python Programming
Course Code	21SBCS231C
Semester	**III**
No. of Credits	**2(36 Lectures of 50 minutes)**

Aims & Objectives of the Course

Sr. No.	**Objectives**
1.	To introduce programming concepts using python
2.	To develop Programming logic using python
3.	To develop basic concepts and terminology of python programming
4.	To test and execute python programs

Expected Course Specific Learning Outcomes

Sr. No.	**Learning Outcome**
1.	Students should be able to develop logic for problem solving
2.	Students should be able to determine the methods to create and develop Python programs by utilizing the data
3.	Student should understand the structures like lists, dictionaries, tuples and sets.
4.	Students should be able to write python programs and develop a small application project

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**An Introduction to Python**	**06**
	1. Introduction to Python -History, features, Applications, Installing Python, Running Simple Python program 2. Basics of Python- Standard data types - basic, none, Boolean (true & False), numbers, Variables, Constants, Python identifiers and reserved words, Lines and indentation, multi-line statements and Comments 3. Input/output with print and input functions 4. Operators- assignment, arithmetic, relational, logical andbitwise operations.	
Unit II	**Control Statement**	**10**
	1. Sequence Control – Precedence of operators, Typeconversion 2. Conditional Statements: if, if-else, nested if-else 3. Looping- for, while, nested loops, loop control statements(break, continue, pass) 4. Strings: declaration, manipulation, special operations, escape character, string formatting operator, Raw String,Unicode strings, Built-in String methods.	
Unit III	**Lists, functions, tuples and dictionaries, Sets**	**14**
	1. Python Lists: Concept, creating and accessing elements, updating & deleting lists, traversing a List, reverse Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods. 2. Functions: Definitions and Uses, Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Flow of Execution, Parameters and Arguments, Variables and Parameters, Stack Diagrams, Void Functions, Anonymous functions	

	Importing with from, Return Values, Boolean Functions, More Recursion 3. Functional programming tools - filter(), map(), and reduce(),recursion, lambda forms. 4. Tuples and Dictionaries: Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, and Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in tuple functions, indexing, slicing and matrices. Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods. 5. Sets- Definition, transaction of set(Adding, Union, intersection), working with sets	
Unit IV	**Modules ,Working with files, Exception handling**	**06**
	1. Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module 2. Packages: Importing package, creating package, examples 3. Working with files: Creating files and Operations on files (open, close, read, write), File object attributes, file positions, Listing Files in a Directory, Testing File Types, Removing files and directories, copying and renaming files, splitting pathnames, creating and moving directories 4. Regular Expression- Concept of regular expression, various types of regular expressions, using match function. 5. Exception Handling: Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions.	

Reference Books:

1. An Introduction to Computer Science using Python by Jason Montojo, Jennifer Campbell, PaulGries, The pragmatic bookshelf-2013
2. James Payne, "Beginning Python: Using Python and Python 3.1,Wrox Publication
3. Introduction to Computer Science Using Python- Charles Dierbach, Wiley Publication Learning with Python ", Green Tea Press, 2002
4. Introduction to Problem Solving with Python by E balguruswamy,TMH publication- 2016
5. Beginning Programming with Python for Dummies Paperback – 2015 by John Paul Mueller 6.Object-oriented Programming in Python, Michael H. Goldwasser, David Letscher,Pearson Prentice Hall-2008

Web Links:

1. https://www.programiz.com/python-programming
2. https://www.w3schools.com/python/python_intro.asp
3. https://www.geeksforgeeks.org/python-programming-language/

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Course/ Paper Title	Software Engineering
Course Code	21SBCS232C
Semester	**III**
No. of Credits	**2(18 Lectures + 18 lecture for Practical)**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To get knowledge and understanding of software engineering discipline.
2.	To learn analysis and design principles for software project development.
3.	To Understand Object Oriented Modeling techniques and their applicability.

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	Compare and choose a process model for a software project development.
2.	Identify requirements analyze and prepare models.
3.	Prepare the SRS, Design document, Project plan of a given software system
4.	To learn and identify the components of Unified Modeling Language.

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Introduction To Software Engineering and Process Models**	**04**
	1. Definition of Software 2. Nature of Software Engineering 3. Changing nature of software 4. Software Process i. The Process Framework ii. Umbrella Activities iii. Process Adaptation 5. Generic Process Model 6. Prescriptive Process Models 7. The Classical Waterfall Model 8. Incremental Process Models 9. Evolutionary Process Models 10. Requirement Analysis 11. Elicitation 12. Software Requirement Specification (SRS)	
Unit II	**Agile Development**	**02**
	1. What is Agility? 2. Agile Process i. Agility Principles ii. The Politics Of Agile Development iii. Human Factors	`
Unit III	**Structural Modeling**	**05**
	1. Concept of UML 2. Advantages of UML 3. Classes 4. Relationship 5. Interface 6. Types and Roles 7. Packages 8. Class Diagram 9. Object Diagram	
Unit IV	**Behavioral & Architectural modeling**	**07**

	1. Interactions 2. Use Cases and Use Case Diagram with stereotypes 3. Interaction Diagram 4. Sequence Diagram 5. Activity Diagram 6. State Chart Diagram 7. Components Diagram 8. Deployment Diagram 9. Collaboration Diagram	
Demonstration	**Mini Project Using SoftwareEngineering Techniques**	**18**
	1. Structural Model 2. Behavioral Model 3. Architectural Model	

References Books:

1. Software Engineering : A Practitioner's Approach - Roger S. Pressman, McGraw hill(Eighth Edition) ISBN-13: 978-0-07-802212-8, ISBN-10: 0-07-802212-6

2. A Concise Introduction to Software Engineering - Pankaj Jalote, Springer ISBN: 978-1-84800-301-9

3. The Unified Modeling Language Reference Manual - James Rambaugh, Ivar Jacobson, Grady Booch ISBN 0-201-30998-X

Web Links:

1. https://www.springboard.com/blog/software-engineering

2. https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-uml/

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Course/ Paper Title	**Practical Course Based on Python Programming**
Course Code	21SBCS233C
Semester	**III**
No. of Credits	**2**

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To develop problem solving and programming capability
2.	To understand the strings and function in Python
3.	Students will be to use list, tuples, sets and dictionary data type
4.	Performing Input/output operations on files.
5.	To Understand Exceptions and Exception handling in python

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	To learn Python IDE environment
2.	To learn different libraries in Python
3.	To develop simple application using Python

Syllabus

Unit No.	Title with Contents	No. of Practical
Unit I	**Assignment 1:** Python Basics and IDE, Simple Python Programs	**2**
Unit II	**Assignment 2:** Strings and Functions	**2**
Unit III	**Assignment 3:** List, Tuples, Sets, and Dictionary	**3**
Unit IV	**Assignment 4:** File Handling and Date-Time	**3**
Unit V	**Assignment 5:** Exception handling and Regular expression	**2**

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Course/ Paper Title	Data Structures and Algorithms using Python
Course Code	21SBCS241C
Semester	**IV**
No. of Credits	**2(36 Lectures of 50 minutes)**

Aims & Objectives of the Course

Sr. No.	Objectives
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
4.	To efficiently implement solutions for specific problems
5.	To apply linear data structures.
6.	To learn the systematic way of solving problem

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	To use well-organized data structures in solving various problems.
2.	To differentiate the usage of various structures in problem solution.
3.	Implementing algorithms to solve problems using appropriate data structures.

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Introduction to Data Structures and Algorithm Analysis**	**04**
	1. Introduction i. Need of Data Structure ii. Definitions - Data and information, Data type iii. Data object, ADT, Data Structure iv. Types of Data Structures 2. Algorithm analysis i. Space and time complexity ii. Best, Worst, Average case analysis iii. Asymptotic notations (Big O, Omega Ω, Thetaθ) iv. Problems on time complexity Calculation.	
Unit II	**Array as a Data Structure**	**10**
	1. ADT of array, Operations 2. Array applications - Searching i. Linear search ii. Binary Search 3. Sorting Terminology- Internal, External, Stable, In-place Sorting 4. Sorting Methods - Bubble Sort, Insertion Sort, Selection Sort, Quick Sort 5. Comparison of sorting methods	
Unit III	**Linked List**	**11**
	1. List as a Data Structure, differences with array. 2. Dynamic implementation of Linked List 3. Types of Linked List – Singly, Doubly, Circular 4. Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, and time complexity of operations.	
Unit IV	**Stack**	**06**
	1. Introduction 2. Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations.	

	3. Implementation- Static and Dynamic with comparison 4. Applications of stack i. Function call and recursion, String reversal, palindrome checking ii. Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix)	
Unit V	**Queue**	**5**
	1. Introduction 2. Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(),time complexity of operations, differences with stack. 3. Implementation - Static and Dynamic with comparison 4. Types of Queue - Linear Queue, Circular Queue, Double Ended Queue	

Reference Books:

1. An Introduction to Computer Science using Python by Jason Montojo, Jennifer Campbell, PaulGries, The pragmatic bookshelf-2013

2. James Payne, "Beginning Python: Using Python and Python 3.1,Wrox Publication

3. Introduction to Computer Science Using Python- Charles Dierbach, Wiley PublicationLearning with Python ", Green Tea Press, 2002

4. Introduction to Problem Solving with Python by E balguruswamy,TMH publication- 2016

5. Beginning Programming with Python for Dummies Paperback – 2015 by John Paul Mueller 6.Object-oriented Programming in Python, Michael H. Goldwasser, David Letscher, Pearson Prentice Hall-2008

Web Links:

1. https://searchapparchitecture.techtarget.com/definition/software-stack
2. https://www.tutorialspoint.com/data_structures_algorithms/dsa_queue.htm
3. https://www.tutorialspoint.com/data_structures_algorithms/array_data_structure.htm

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Course/ Paper Title	Operating System
Course Code	21SBCS242C
Semester	**IV**
No. of Credits	**2(18 Lectures +18 lecture for practical)**

Aims & Objectives of the Course

Sr. No.	**Objectives**
1.	To understand the concept of operation system and its principle
2.	To study the various functions and services provided by operating system
3.	To understand the notion of process

Expected Course Specific Learning Outcomes

Sr. No.	**Learning Outcome**
1.	Processes and Thread Scheduling by operating system
2.	Memory management by operating system using with the help of various schemes
3.	Design and implement shell function

Syllabus

Unit No.	Title with Contents	No. of Lectures
Unit I	**Introduction to Operating System**	**2**
	1. Operating Systems Overview 2.Computing Environments 3.Open source operating System 4.Operating System services	
Unit II	**Process**	**2**
	1. Concept of Process 2 .Process Scheduling i. Scheduling queues ii. Schedulers 3. Operations on Process i. Process creation with program using fork() ii. P Process termination	
Unit III	**CPU Scheduling**	**4**
	1. Basic Concept i. CPU I/O burst cycle ii. Scheduling Criteria iii. CPU scheduler iv. Preemptive scheduling v. Dispatcher 2. Scheduling Algorithms i. FCFS ii. SJF iii. Priority scheduling iv. Round-robin scheduling	
Unit IV	**Memory Management**	**10**

	1. Background i. Logical versus physical address space ii. Dynamic loading iii. Dynamic linking and shared libraries iv. Swapping 2. Contiguous Memory Allocation i. Memory mapping and protection, ii. Memory allocation, Fragmentation 3. Paging 4. Segmentation 5. Virtual Memory Management 6. Overview of Deadlock	
Demonstration	**Programming Assignments**	18
	Teacher should give demonstration of various programs mentioned below in the classroom or in the laboratory as per their convenience. Programming assignments should be done individually by the student in their respective login From the list given in Lab book. **Assignment 1** CPU Scheduling (FCFS,SJF, Priority, Round Robin) **Assignment 2**– Page Replacement Algorithm (FIFO, Optimal)	

References Books:

1. Operating System Concepts, Avi Silberschatz, Peter Galvin, Greg Gagne, Student Edition, Wiley Asia
2. Operating Systems: Internals and Design Principles, William Stallings, Prentice Hall of India.
3. Advanced Concepts in Operating Systems, M Singhal and NG Shivaratri, Tata McGraw Hill Inc, 2001
4. The 'C' Odyssey, UNIX-the open boundless C, Meeta Gandhi,Tilak Shetty,Rajiv Shah, BPB publication

Web Links:

1. https://www.tutorialspoint.com/operating_system/os_process_scheduling_algorithms.htm
2. https://www.javatpoint.com/os-paging-with-example
3. https://www.javatpoint.com/memory-management-operating-system

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Course/ Paper Title	**Practical Course Based on Data Structure using Python**
Course Code	21SBCS243C
Semester	**IV**
No. of Credits	**2**

Aims & Objectives of the Course

Sr. No.	**Objectives**
1.	To develop problem solving and programming capability
2.	To understand the arrays and function in Python
3.	Students will understand Linked List, Stack and Queue
4.	Performing Input/output operations

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	To learn Programming implantation of sorting and techniques
2.	Implementing algorithms to solve problems using appropriate data structures.
3.	To create and perform different operation on link list, stack, queue using Python

Syllabus

Unit No.	Title with Contents	No. of Practical
Unit I	**Assignment 1:** Programming implementation of searching and sorting techniques	**2**
Unit II	**Assignment 2:** Programs based on Singly Linked List	**3**
Unit III	**Assignment 3:** Programs based on Doubly Linked List	**3**
Unit IV	**Assignment 4:** Programs based on Stack	**2**
Unit V	**Assignment 5:** Programs based Queue	**2**