Siddharth University, Kapilvastu, Siddharthnagar

SYLLABUS
of
Computer Science
as
MINOR
for
B.Sc. Programme

(According to CBCS & NEP 2020)

[With effect from the Academic Year 2025-26 onwards Approved in Board of Studies (BOS) meeting on dated 21/11/2025]

Year wise structure of B.Sc. Computer Science (MINOR) Syllabus

The Computer Science programme shall be offered as a Minor subject under the 4-Year Undergraduate Programme (FYUGP) in B.Sc. as per the guidelines of the State Higher Education Council. Students may opt for the Minor subject in I, II, III and IV Semester under the Choice Based Credit System (CBCS) in combination with another two Major subject, as approved by the University/College.

Year	Semester	Course Code	Paper Title	Theory/ Practical	Credits
First	I	BMCCS101T	**Problem Solving using Computer**	**Theory**	**4**
Second	III	BMCCS301T	**Operating Systems**	**Theory**	**4**

Syllabus Developed by:

S.No.	Name	Designation	Department	College/ University
1	Dr. Ashwini Kumar Srivastava	Asst. Professor & Head	Dept. of Computer Application	Shivharsh Kisan P.G. College, Basti

DETAIL SYLLABUS FOR B.Sc.-I Year/ I-Semester (Computer Science)
(Minor)

Course Title: Problem Solving using Computer (UG 4 Year Course)

Course Code: BMCCS101T

Credit Units: 4

Level: UG

Credit Distribution of the course		
Lecture (L)	**Tutorial (T)**	**Practical (P)**
04	**-**	**-**

Course Objectives:
- Develops basic understanding of computers and its applications.
- Develops the ability to work with computers using various networks/Internet.
- Develops the use of the Python Programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.
- Introduces the more advanced features of the Python and R Language.

Prerequisites: Basic knowledge of Computer.

Course Contents/Syllabus:

Unit	Topic	No. of Lectures
I	**Computer Fundamentals:** Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers.	7
II	**Basic Computer Organization** - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. **Planning the Computer Program:** Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.	8
III	**Techniques of Problem Solving:** Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.	7
IV	**Overview of Programming:** Structure of a PythonProgram, Elements of Python	8
V	**Introduction to Python:** Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).	8
VI	**Creating Python Programs:** Input and Output Statements, Control statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement-if...else,Difference between break, continue and pass).	7
VII	**Structures:** Numbers, Strings, Lists, Tuples, Dictionary, Date &Time, Modules, Defining Functions, Exit function, default arguments.	7

VIII	**Introduction to Advanced Python:** Objects and Classes, Inheritance, Regular Expressions, Event Driven Programming, GUI Programming.	8

Suggested Readings:

1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computerscientist : learning with Python , Freely available online.2012
6. Ashwini Kr Srivastava & Vijay Kumar "A Text Book of Python Programming Essentials: From Basics to Advanced", Discount Group of Publication, 2024

Suggestive digital platforms web links-

1. https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-1/9788131733097
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds
4. http://www.ibiblio.org/g2swap/byteofpython/read/

DETAIL SYLLABUS FOR B.Sc.-II Year/ III-Semester (Computer Science)
(Minor)

Course Title: Operating Systems (UG 4 Year Course)

Course Code: BMCCS301T

Credit Units: 4

Level: UG

Credit Distribution of the course		
Lecture (L)	**Tutorial (T)**	**Practical (P)**
04	**-**	**-**

Course Objectives:
- Understand role, responsibilities, features, and design of operating system.
- Analyze memory management schemes and process scheduling algorithms.
- Apply process synchronization techniques to formulate solution for critical sectionproblems.
- Illustrate concept of disk scheduling.
- Evaluate process deadlock handling techniques

Prerequisites: Basic knowledge of Computer.

Course Contents/Syllabus:

Unit	Topic	No. of Lectures
I	**Introduction** Operating system and functions, Classification of Operating systems: Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure, System Components, Operating System Services, Kernels, Monolithic and Microkernel Systems.	8
II	**Process Management** Process Concept, Process States, Process Synchronization, Critical Section, Mutual Exclusion, Classical Synchronization Problems, Process Scheduling, Process States, Process Transitions, Scheduling Algorithms Interprocess Communication, Threads and their management, Security Issues.	8
III	**CPU Scheduling** Scheduling Concepts, Techniques of Scheduling, Preemptive and Non- Preemptive Scheduling: First-Come-First-Serve, Shortest Request Next, Highest Response Ration Next, Round Robin, Least Complete Next, Shortest Time to Go, Long, Medium, Short Scheduling, Priority Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	7
IV	**Memory Management** Memory allocation, Relocation, Protection, Sharing, Paging, Segmentation, Virtual Memory, Demand Paging, Page	7

	Replacement Algorithms, Thrashing.	
V	**I/O Management and Disk Scheduling** I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID.	**7**
VI	**File System:** File concept, File organization and access mechanism, Filedirectories, and File sharing, File system implementation issues, File system protection and security.	**8**
VII	**Shell introduction and Shell Scripting:** What is shell and various type of shell, Various editors present in linux, Different modes of operation in vi editor	**7**
VIII	What is shell script, Writing and executing the shell script, Shell variable (user defined and system variables), System calls, Using system calls, Pipes and Filters, Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)	**8**

Suggested Readings:

1. Andrew S. Tanenbaum and Herbert Bos,"Modern Operating Systems," Fourth Edition,Pearson, 2014.
2. Abraham Silberschatz, Greg Gagne, and Peter B. Galvin, "Operating System Concepts,"Tenth Edition, Wiley, 2018.
3. William Stallings, "Operating Systems: Internals and Design Principles," Seventh Edition,Prentice Hall, 2011.
4. Dhanjay Dhamdhere, "Operating Systems," First Edition, McGraw-Hill, 2008

Suggestive digital platforms web links:

1. http://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/pythonds
3. https://www.r-project.org