



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Application

Choice Based Credit System (CBCS) in the light of NEP-2020

B. C. A. (IBM) Batch (2026-29)

SEMESTER-I (2026-27)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA 103N	Minor- 1	Software Engineering Fundamentals	Max	60	20	20	0	0	4	0	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To provide knowledge about system development.
2. To impart knowledge about software process models.
3. To provide detailed knowledge about software development.
4. To acquaint students with programming part.
5. To provide study Software Architecture, Design, and Patterns.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** An ability to understand system development.
- CO2** An ability to apply knowledge of software process models.
- CO3** An ability to develop software.
- CO4** An ability to apply programming on software development problems.
- CO5** An ability to understand Software Architecture, Design, and Patterns.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

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ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

There are no formal prerequisites.

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	What is Software Engineering? Introduction to the SDLC, Phases of the SDLC, Activity: Phases in the SDLC, Building Quality Software, Requirements, Software Development Methodologies, Software Versions, Software Testing, Software Documentation, Roles in Software Engineering Projects, Insiders' Viewpoint: Job Roles in Software Engineering Teams, The Software Building Process and Associated Roles.	12	ATL1 ATL3 ATL5 ATL6 ATL8
II	Introduction to Software Development: Overview of Web and Cloud Development, Learning Front-End Development, The Importance of Back-End Development, Teamwork and Squads, Insiders' Viewpoint: Teamwork in Software Engineering, Pair Programming, Activity: Categorizing Front-end and Back-End Technologies, Application Development Tools, Software Stacks, Hands-on Lab: Getting Started With an IDE,	12	ATL1 ATL3 ATL5 ATL6 ATL8

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BCABDA 103N	Minor-1	Software Engineering Fundamentals	Max	60	20	20	0	0	4	0	0	4
			Min	24	16		0	0				

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	Tools in Software Development.		
III	Introduction to Programming: Comparing Compiled and Interpreted Languages, Query and Assembly Languages, understanding Code Organization Methods, Insiders' Viewpoint: Types of Languages, Programming Languages and Organization, Branching and Looping Programming Logic, Hands-on Lab: Programming Fundamentals with Python, Introduction to Programming Concepts.	12	ATL1 ATL3 ATL5 ATL6 ATL8
IV	Software Architecture, Design, and Patterns: Introduction to Software Architecture, Software Design and Modeling, Object-Oriented Analysis and Design, Activity: Create an Architectural Diagram, Software Architecture and Design, Approaches to Application Architecture, Architectural Patterns in Software, Application Deployment Environments, Production Deployment Components, Software Architecture Patterns and Deployment Topologies.	12	ATL1 ATL3 ATL5 ATL6 ATL8
V	Job Opportunities and Skillsets: What Does a Software Engineer Do?, A Day in the Life of a Software Engineer, Skills Required for Software Engineering, Insiders' Viewpoint: Advice to Future Software Engineers, Job Outlook for Software Engineers, Career Paths in Software Engineering, Software Engineering Job Titles, Activity: Matching Roles with Responsibilities, Code of Ethics.	12	ATL1 ATL3 ATL5 ATL6 ATL8
	Total Hours	60	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

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BCABDA 103N	Minor-1	Software Engineering Fundamentals	Max	60	20	20	0	0	4	0	0	4
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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

SUGGESTED READINGS:

Textbooks

1. R. S. Pressman, "Software Engineering - A practitioner's approach", 6th ed., McGraw Hill Int.
2. Pankaj Jalote "Software Engineering", Kindle Edition, Wiley Publications.
3. Ian Sommerville: Software Engineering 6th Edition (Addison-Wesley).

Reference Books

1. Richard Fairley: Software Engineering Concepts (TMH).
2. Elis Awad, "System Analysis & Design", Galgotia publications.
3. W.S. Jawadekar: Management Information Systems, TMH Publication, India.

Suggested e- resources (Websites/e- books)

1. NPTEL – Software Engineering (IIT Kharagpur) <https://nptel.ac.in/courses/106105182>
2. NPTEL – Software Project Management (IIT Bombay) <https://nptel.ac.in/courses/106101061>
3. SWAYAM – Software Engineering (UGC / CEC) <https://swayam.gov.in>
4. University of Oxford – Software Engineering Notes <https://www.cs.ox.ac.uk/softeng>

COURSE ARTICULATION MATRIX (MAPPING OFCOs WITH POs)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	H	H	H	M	H	L	L	L	-	-	-
CO2	M	-	L	-	-	-	L	-	-	-	-	-
CO3	L	H	H	H	M	H	L	L	L	-	-	-
CO4	H	H	-	-	-	L	-	-	-	-	-	-
CO5	L	-	-	L	L	-	-	-	-	-	-	-

H= more than 50% of CO is mapped to particular PO

M= more than 30% and less than 50% of CO is mapped to particular PO

L= Less than 20% of CO is mapped to particular PO

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BCABDA 101M	Major- 1	C/C++ Programming	Max	60	20	20	0	0	4	0	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To understand the concept of templates and their usage in C++.
2. To understand the memory model in C++ and the stack vs. heap allocation.
3. To explore advanced data structures such as linked lists, trees, and graphs.
4. To understand file handling concepts and techniques in C++.
5. To explore advanced features such as lambda expressions, move semantics, and constexpr.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1 Implement memory model in C++ and the stack vs. heap allocation.
- CO2 Demonstrate advanced data structures such as linked lists, trees, and graphs.
- CO3 Apply file handling concepts and techniques in C++.

TEACHING PEDAGOGY:

- T1 Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

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ASSESSMENT TOOLS:

ATL1	Quiz
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ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic C programming skills, logical thinking, basic mathematics

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Advanced C++ Concepts and OOP: Advanced topics such as function pointers and virtual functions, exception handling and error handling mechanisms in C++, principles of OOP and its implementation in C++, advanced OOP concepts such as inheritance, polymorphism, and encapsulation, advanced techniques for designing and implementing classes and objects.	15	ATL3 ATL5 ATL6 ATL8
II	Memory Management in C++: Memory model in C++ and the stack vs. heap allocation, dynamic memory allocation and deallocation using new and delete operators, techniques for managing memory efficiently, including smart pointers and RAII (Resource Acquisition Is Initialization).	12	ATL3 ATL5 ATL6 ATL8
III	Advanced Data Structures and Algorithms: Advanced data structures such as linked lists, trees, and graphs, basics of algorithm design and analysis, Implement and analyze common algorithms using C++, including sorting and searching algorithms.	15	ATL3 ATL5 ATL6 ATL8

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IV	File I/O and Exception Handling: File handling concepts and techniques in C++, read from and write to files using streams, Exception handling mechanisms to handle errors and exceptions in C++ programs.	10	ATL3 ATL5 ATL6 ATL8
V	Advanced Topics in C++: Advanced features such as lambda expressions, move semantics, and constexpr, basics of multithreading and concurrency in C++, C++ standard libraries and their usage for advanced programming tasks.	08	ATL3 ATL5 ATL6 ATL8
Total Hours		60	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

- Robert Lafore, "Object-Oriented Programming in C++", 4e, SAMS.
- Ricahrd C. Lee, Wiiliam M. Tepfenhart "UML & C++: A Practical Guide To Object Oriented Development", 2e, Pearson.
- Herbert Schildt, "C++ the complete reference", 4e, 2003.

Reference Books

- E Balagurusamy, "Object Oriented Programming with C++", 6e, McGraw Hill Education.
- G. Booch, "Object Oriented Analysis And Design With Applications", 3e, Pearson.
- K.R. Venugopal, RajkumarBuyya, "Mastering C++", 2e, McGraw Hill Education.

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Suggested e- resources (Websites/e- books)

- Fundamentals of C++ (IBM)** — hands-on labs, syntax, logic building, auto-evaluated coding exercises edx.org/course/fundamentals-of-c
- Data Structures & Algorithms Using C++ (IBM)** — implements linear and non-linear data structures in C++ Available on edX under IBM Professional Certificate
- Object Oriented Implementation Using C++ (IBM)** — builds a thorough understanding of OOP concepts using C++ with auto-evaluated hands-on labs edx.org/course/object-oriented-implementation-using-c

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M	M				L		L	M	
CO2	H	H	H	M				L	L		M	
CO3	M	H	M	H	L			L		L		

H= more than 50% of CO is mapped to particular PO

M= more than 30% and less than 50% of CO is mapped to particular PO

L= Less than 20% of CO is mapped to particular PO

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA 101M (P)	Practical (Major-1)	C/C++ programming Lab	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		13.5	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

- 1 To familiarize the students with programming and to encourage them to develop their logic.
- 2 To make students well versed with C language to solve problems efficiently.
- 3 Using simple and well drawn illustrations develop their programming skills using modular programming.
- 4 To cover the various data structures and their applications

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Apply OOP Principles using Advanced C++ Constructs
- CO2** Implement Effective Memory Management Techniques in C++
- CO3** Design and Analyze Advanced Data Structures and Algorithms
- CO4** Develop Robust C++ Programs using File I/O, Exception Handling, and Modern C++ Features

ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

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BCABDA 101M (P)	Practical (Major-1)	C/C++ programming Lab	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		13.5	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

PREREQUISITES:

Basic C programming skills, logical thinking, basic mathematics

SYLLABUS:

List of Experiments

S No	Experiments	CO Mapping
1.	Write a program in C++ to implement a class Rectangle with data members length and breadth, and member functions to calculate and display its area and perimeter using the concept of encapsulation.	CO1
2.	Write a program in C++ to demonstrate function overloading by creating three overloaded functions named multiply that multiply two integers, two floats, and three integers respectively.	CO1
3.	Write a program in C++ to implement single inheritance where a base class Animal has a method speak() and a derived class Dog overrides it to display a custom message.	CO1
4.	Write a program in C++ to create an abstract class Shape with a pure virtual function draw() and implement it in two derived classes Circle and Square to display the shape name and its properties.	CO1
5.	Write a program in C++ to demonstrate the use of a copy constructor by creating a Book class with title and price, and copying one object to another while displaying both objects' data.	CO1
6.	Write a program in C++ to dynamically allocate memory for an array of n integers at runtime, accept values from the user, display the array, and then deallocate the memory using the delete[] operator.	CO2
7.	Write a program in C++ to demonstrate dynamic memory allocation and deallocation using the new and delete operators for a one-dimensional and two-dimensional integer array.	CO2
8.	Write a program in C++ to implement the RAII (Resource Acquisition Is Initialization) principle by designing a file wrapper class that automatically opens a file on construction and closes it on destruction.	CO2

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Choice Based Credit System (CBCS) in the light of NEP-2020

B. C. A. (IBM) Batch (2026-29)

SEMESTER-I

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA 101M (P)	Practical (Major-1)	C/C++ programming Lab	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		13.5	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

- | | | |
|-----|--|-----|
| 9. | Write a program in C++ to create a class Student with dynamic memory allocation for storing a student's name as a character array, and demonstrate proper memory management using a destructor. | CO2 |
| 10. | Write a program in C++ to implement a simple dynamic stack using pointer-based dynamic memory allocation with push, pop, and display operations, ensuring proper deallocation. | CO2 |
| 11. | Write a program in C++ to implement a singly linked list with operations for insertion at the beginning, insertion at the end, deletion of a node by value, and display of all nodes. | CO3 |
| 12. | Write a program in C++ to implement a stack using a singly linked list with push, pop, and display operations, and demonstrate its LIFO (Last In First Out) behavior with a sample sequence of integers. | CO3 |
| 13. | Write a program in C++ to implement a queue using a singly linked list with enqueue, dequeue, and display operations, and demonstrate its FIFO (First In First Out) behavior. | CO3 |
| 14. | Write a program in C++ to implement insertion sort on an array of 10 integers entered by the user and display the array after each pass of the sorting process. | CO3 |
| 15. | Write a program in C++ to implement a binary search algorithm on a sorted array of integers and display whether the searched element is found along with its index position. | CO3 |
| 16. | Write a program in C++ to copy the contents of one text file to another text file line by line using ifstream and ofstream, and display the total number of lines and words copied. | CO4 |
| 17. | Write a program in C++ to write a user's name, age, and city to a text file and read back the contents of the file and display them on the screen using ofstream and ifstream. | CO4 |
| 18. | Write a program in C++ to append multiple lines of text to an existing file using file streams, and then display the complete updated file contents on the screen. | CO4 |
| 19. | Write a program in C++ to handle divide-by-zero and negative number input exceptions using try-catch blocks, displaying appropriate error messages for each type of exception. | CO4 |

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ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

-Oriented Programming in C++", 4e, SAMS.

m M. Tepfenhart "UML & C++: A Practical Guide To Object Oriented
erson.

the complete reference", 4e, 2003.

Reference Books

1. E Balagurusamy, "Object Oriented Programming with C++", 6e, McGraw Hill Education.
2. G. Booch, "Object Oriented Analysis And Design With Applications", 3e, Pearson.
3. K.R. Venugopal, RajkumarBuyya, "Mastering C++", 2e, McGraw Hill Education.

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Suggested e- resources (Websites/e- books)

1.	Fundamentals of C++ (IBM) — hands-on labs, syntax, logic building, auto-evaluated coding exercises edx.org/course/fundamentals-of-c
2.	Data Structures & Algorithms Using C++ (IBM) — implements linear and non-linear data structures in C++ Available on edX under IBM Professional Certificate
3.	Object Oriented Implementation Using C++ (IBM) — builds a thorough understanding of OOP concepts using C++ with auto-evaluated hands-on labs edx.org/course/object-oriented-implementation-using-c

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M	H	L	M	L	L	M	M	H	L
CO2	H	H	H	H	L	L	L	L	L	M	M	L
CO3	H	H	H	M	M	L	M	L	M	L	H	L
CO4	H	H	M	H	M	M	M	M	L	H	H	M

H= more than 50% of CO is mapped to particular PO

M= more than 30% and less than 50% of CO is mapped to particular PO

L= Less than 20% of CO is mapped to particular PO

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