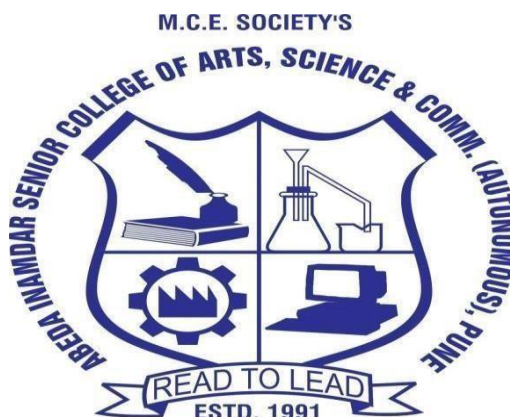


M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce (Autonomous), Pune-1
Affiliated to Savitribai Phule Pune University
NAAC accredited 'A' Grade



Faculty of Commerce & Management

B.B.A (C.A) PROGRAM

STRUCTURE

Under NEP 2020

**Choice Based Credit System (CBCS) under
Autonomy**

(Semester Pattern)

**Bachelor of Business Administration (Computer
Application) Program (2023 Pattern)**

With effect from 2024-25

Faculty of Commerce & Management

Guidelines for the award of

**Bachelor of Business
Administration (Computer
Application),**

**B.B.A (C.A) Honors & B.B.A (C.A)
Honors with Research**

**3/4 Years U.G. Program Structure
under NEP 2020**

**Applicable for the Autonomous College
affiliated to**

Savitribai Phule Pune University

With effect from June 2024

M.C.E Society's
Abeda Inamdar Senior College of Arts, Science & Commerce, Pune
DEPARTMENT OF BBA (CA)

Semester III					
Course Type	Course Code	Course Name	Credits		Total
			Theory	Practical	
Major/Core Theory	23CBCA31MM	Data Structures	2	-	2
Major/Core Theory	23CBCA32MM	Introduction to PHP	2	-	2
Major/Core Theory	23CBCA33MM	Software Engineering	2	-	
Major/Core Practical	23CBCA34MM	Lab I- Practical on Data Structures	-	2	2
Minor Theory	23CBCA31MNA 23CBCA31MNB	Introduction to Digital and Social Media Marketing	2	-	2
		OR Data Warehousing			
Minor Practical	23CBCA32MNA 23CBCA32MNB	Lab III- Practical on Introduction to Digital and Social Media Marketing	-	2	2
		OR Lab III- Practical on Data Warehousing			
GE/OE		From the Basket of Science/Arts	2	-	2
VSC	23CBCA31VS	Lab II- Practical on Introduction to PHP	-	2	2
AECC	23ABH31AE	Hindi	2	-	2
NSS/NCC/Sports/Physical Education		From the basket of CC	2	-	2
FP	23CBCA3FP	Field Project	-	2	-
			14	8	22

M.C.E Society's
Abeda Inamdar Senior College of Arts, Science & Commerce, Pune
DEPARTMENT OF BBA (CA)

Semester IV					
Course Type	Course Code	Course Name	Credits		Total
			Theory	Practical	
Major/Core Theory	23CBCA41MM	Object Oriented Programming using C++	2	-	2
Major/Core Theory	23CBCA42MM	Advance PHP	2	-	2
Major/Core Theory	23CBCA43MM	Object Oriented Software Engineering (OOSE)	2	-	2
Major/Core Practical	23CBCA44MM	Lab I- Practical on Object Oriented Programming using C++	-	2	2
Minor Theory	23CBCA41MNA 23CBCA41MNB	Search Engine Optimization OR Fundamentals of Data Integration and ETL	2	-	2
Minor Practical	23CBCA42MNA 23CBCA42MNB	Lab III- Practical on Search Engine Optimization OR Lab III- Practical on Fundamentals of Data Integration and ETL fundamentals	-	2	2
GE/OE		From the basket of Science/Arts	2	-	2
SEC	23CBCA41SC	Lab II- Practical on Advance PHP	2	--	2
AECC	23ABH41AE	Hindi	2	-	2
NSS/NCC/Sports/Physical Education		From the basket of CC	2	-	2
CEP	23CBCA4CEP	Community Engagement Program	-	2	2
			16	6	22

Semester 3



M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Data Structures		Semester : III
Course Code : 23BCA31MM		No. of Credits : 02
Nature of Course : Major		Total Teaching Hours :30 Hrs.

Course Objectives	
1.	The course aims to provide exposure to understand the concepts of ADTs , sorting, searching
2.	It aims to train the student to learn linear data structures – lists, stacks, and queues
3.	To Understand basic concepts about trees

Course Outcome	
1.	Implementing data structures in various applications
2.	Design and implement various data structures
3.	Apply sorting and searching algorithms to the small and large data sets
4.	To learn the concept of linked list, its types and applications
5.	To understand the concept of stacks and queues, their applications and implementations
6.	To learn the concept of trees, their types

Syllabus		
Unit I	Basic Concept and Introduction to Data Structure	06 Hours
	1. Introduction to Data Structure	1
	2. Types of Data structure	1
	3. Abstract Data Types (ADT)	1
	4. Algorithm-Definition and characteristics	1
	5. Algorithm Analysis -Space Complexity -Time Complexity	1
	6. Self-Referential Structure	1
Unit II	Linear data structures	05 Hours
	1. Sorting algorithms with efficiency	
	i. Bubble sort,	1
	ii. Insertion sort,	1
	iii. Selection Sort	1
	2. Searching techniques	2
	i. Linear Search	
	ii. Binary search	
Unit III	Linked List	06 Hours
	1. Introduction to Linked List	1
	2. Implementation of Linked List – Static & Dynamic representation	1
	3. Types of Linked List	4
	i. Singly Linked list(All type of operation)	
	ii. Doubly Linked list (Create , Display)	
	iii. Circularly Singly Linked list	
	iv. Circularly Doubly Linked list	
Unit IV	Stack	05 Hours
	1. Introduction	1
	2. Representation- Static & Dynamic	1
	3. Primitive Operations on stack	1
	4. Applications of Stack	1

	5. Conversion of Infix, prefix, postfix , Evaluation of postfix and prefix	1
Unit V	Queues	04 Hours
	1. Introduction	1
	2. Representation - Static & Dynamic	1
	3. Primitive Operations on Queue	1
	4. Types of Queue	1
Unit VI	Tree	04 Hours
	1. Concept & Terminologies	1
	2. Types of Tree-Binary tree, binary search tree	1
	3. Tree Traversals (preorder, inorder, postorder)	1
	4. Height balanced tree- AVL trees	1

Suggested Readings	
1.	Horowitz Sahani, “Fundamentals of Data Structures”, Second Edition
2.	YedidyahLangsam, Aaron M. Tenenbaum, Moshe J. Augenstein, “Data Structures using C and C++”, Second Edition, Pearson Education
3.	Bandopadhyay & Dey,” Data Structures using C”, First Edition, Pearson Education.
4.	S.K.Srivastava and Deepali Srivastava,” Data Structures Through C in Depth”, Second Edition, BPB Publication.
5.	Ashok Kamthane,” Introduction to Data Structures using C”, Pearson Education

Website Reference Links:

- **Introduction to Tree:** <https://www.geeksforgeeks.org/introduction-to-tree-data-structure-and-algorithm-tutorials/>
- **Stack and Queue introduction:** <https://www.javatpoint.com/ds-stack-vs-queue>
- **Introduction to Linked List:** <https://www.shiksha.com/online-courses/articles/introduction-to-linked-lists/>

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)
Under NEP 2020

Course Title : Introduction to PHP		Semester : III
Course Code : 23CBCA32MM		No. of Credits : 02
Nature of Course : Major		Total Teaching Hours : 30 Hrs

Course Objectives	
1.	Understand how server-side programming works on the web
2.	Using PHP built-in functions and creating custom functions
3.	Understanding POST and GET in form submission.
4.	How to receive and process form submission data
5.	Read and process data in a MySQL database

Course Outcome	
1.	Write PHP scripts to handle HTML forms.
2.	Write regular expressions including modifiers, operators, and meta characters.
3.	Create PHP programs that use various PHP library functions, and that manipulate files and directories.
4.	Analyze and solve various database tasks using the PHP language
5.	Analyze and solve common Web application tasks by writing PHP programs

Syllabus		
Unit I	PHP Basics	06 hours
	1. Setting up a development environment	2
	2. Variables, numbers and strings	2
	3. Calculations with PHP	2
	4. Using Arrays	2
Unit II	Control Structures and Loops	06 hours
	1. Conditional Statements	2
	2. Using Loops for Repetitive tasks	2
	3. Combining Loops and Arrays	2
Unit III	Functions, Objects and Errors	06 hours
	1. PHP's Built-in functions	2
	2. Creating Custom functions	2
	3. Passing Values by Reference	2
Unit IV	Working with Forms	06 hours
	1. Building a Form	2
	2. Processing a Form's Data	2
	3. Differences between POST and GET	2
Unit V	MySQL Database Overview	06 hours
	1. phpMyAdmin Overview	2
	2. Using a MySQL Database	2
	3. Reading and Writing Data	2

Suggested Readings	
1.	Vikram Vaswani, “Php: A Beginner's Guide”, 1st Edition McGraw-Hill Osborne Media
2.	Joel Murach and Ray, Harris Murach’s PHP and MySQL (2nd Edition)
3.	Steven Holzner (Author), PHP: The Complete Reference Paperback – 1 Jul 2017
4.	Dr. Prashant Mulay, Prof Samad Khan, PHP, 1 st Edition 2024, Nirali Publication

Website Reference Link:

- **PHP Basis:** <https://www.geeksforgeeks.org/php-tutorial/>
- **PHP control structures:** <https://www.geeksforgeeks.org/php-loops/>
- **PHP Functions:** <https://www.php.net/manual/en/functions.user-defined.php>
- **PHP forms :** https://www.w3schools.com/php/php_forms.asp
- **PHP Database:** https://www.w3schools.com/php/php_mysql_intro.asp

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)
Under NEP 2020

Course Title : Software Engineering		Semester : I
Course Code : 23CBCA33MM		No. of Credits : 02
Nature of Course : Major		Total Teaching Hours : 30 Hrs.

Course Objectives	
1.	To understand System concepts.
2.	To understand Software Engineering concepts.
3.	To understand the applications of Software Engineering concepts and Design in Software

Course Outcome	
1.	Understand fundamental concepts of software engineering and analyze process models required to develop a software system.
2.	Analyze software requirements and model requirements for the given scenario.
3.	Apply design concepts and metrics for software development.
4.	Apply testing strategies and techniques for quality software.
5.	Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

Syllabus		
Unit I	Introduction to Software Engineering	05 hours
	1. Definition and Characteristics of Software.	1
	2. Definition and Need of Software Engineering.	1
	3. Process Framework.	1
	4. Mc Call's Quality factors	1
	5. Umbrella Activities.	
Unit II	Software Development Life Cycle(SDLC)	04 hours
	1. Introduction to Software Development Life Cycle (SDLC)	1
	2. Software Life cycle models	3
	i) Waterfall model	
	ii) Spiral model	1
	iii) Rapid Application Development	
	3. Introduction to Emerging Trends in Agile	
Unit III	Requirement Engineering	05 hours
	1. Introduction	01
	2. Tasks of Requirement Engineering	01
	3. Feasibility study	01
	4. Fact Finding Techniques	01
	5. SRS Format	01
Unit IV	Analysis And Design Tools	08 hours
	1. Decision Tree and Decision Table	01
	2. Data Flow Diagrams (DFD) (Up to 2nd level)	02
	3. Data Dictionary, Elements of Data Dictionary, Advantages and Disadvantages of Data Dictionary	02
	4. Input and Output Design	01
	5. Case Study using Analysis and Design Tools.	02

Unit V	Agile Software Development	08 hours
	1. Introduction to Agile Software Development	1
	2. Scrum Framework.	2
	3. Kanban and Lean Principles.	3
	4. Extreme Programming (XP).	2

Suggested Readings	
1.	Software Engineering: A Practitioner's Approach- Roger S. Pressman, McGraw hill International Editions 2010(Seventh Edition)
2.	System Analysis, Design and Introduction to Software Engineering (SADSE) - S. Parthsarthy, B.W. Khalkar
3.	Analysis and Design of Information Systems (Second Edition) - James A. Senn, McGraw Hill
4.	System Analysis and Design- Elias Awad, Galgotia Publication, Second Edition

Website Reference Link:

- **McCall's Software Quality Model:** <https://www.geeksforgeeks.org/mccalls-quality-model>
- **Introduction to Emerging Trends in Agile:** <https://blog.bydrec.com/top-trends-in-agile-development>
- **Requirement Engineering :** <https://www.javatpoint.com/software-engineering-requirement-engineering>
- **Analysis And Design Tools:**
https://www.tutorialspoint.com/software_engineering/software_analysis_design_tools.htm
- **Agile software development :** <https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development>.

S.Y.B.B.A (C.A) Lab I - Practical on Data Structures

2023-24 (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Lab I - Practical on Data Structures		Semester : III
Course Code : 23BCA34MM		No. of Credits : 02
Nature of Course : Major Practical		Total Teaching Hours : 60 Hrs.

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To study various arrays, Sorting, Searching Techniques
2.	To learn briefly the concept of Linked List, Stack, Queue.
3.	To understand the concept of Trees

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	Explain use of Sorting and Searching Techniques.
2.	Write programs using Types of Linked List.
3.	Various operations to be performed on stack and Queue.
4.	The concept of trees

Best IDE used for Data Structures:

Sr No.	Name of IDE or Tool	Latest Version
1.	Turbo C	3.2/3.3
2.	Microsoft Visual Studio Code	1.56

Assignment No	Assignment Name	No. Of Sessions
1	Assignment based on Sorting Techniques	3
2	Assignment based on Searching Techniques	3
3	Assignment based on Linked List	3
4	Assignment based on Stack	3
5	Assignment based on Queue	3
	Total Number of Sessions	15

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)
Under NEP 2020

Course Title : Data Warehousing		Semester : III
Course Code : 23CBCA31MNB		No. of Credits : 02
Nature of Course : Minor		Total Teaching Hours : 30 Hrs.

Course Objectives	
1.	The course, students will work on an end-to-end development project, building a working data.
2.	It aims to train the student to the basic concepts of the Data Warehouse.
3.	This course will provide students with the conceptual background and hands on keyboard skills needed to utilize a data warehouse effectively

Course Outcome	
1.	Compare modern and classic strategies of data modeling
2.	Understand data warehouse architecture Maintain data quality Integrate a data warehouse in a broader data platform
3.	Translate common cross-industry data analysis requirements into efficient, flexible dimensional models
4.	Maximize the usability and performance of your data warehouse or data mart designs
5.	Model data requirements directly with stakeholders

Syllabus		
Unit I	Introduction to Data Warehousing	07 hours
	1. Introduction	1
	2. History of Data Warehousing	1
	3. Data Warehouse Components (Interactive sector, integrated sector, Near Line sector, Archival sector.)	1
		1
	4.Data Warehouse Concepts: Kimball vs. Inmon	1
		2
	5. Data Warehouse Development Life Cycle	
	6. Data Warehouse Design (Top-down Approach & Bottom-Up Approach)	
Unit II	Data Modeling & Schemas	07 hours
	1. What is Data Modeling in Data Warehouse & Types (Enterprise Warehouse, Data Mart & Virtual Warehouse)	1
		2
	2. Data Warehouse Schemas (Star Schema, Snowflake Schema, Galaxy Schema)	1
		1
	3. Difference Between Star Schema and Snowflake Schema	2
	4. Case Studies (Star Schema, Snowflake Schema, Galaxy Schema)	
Unit III	ETL(Extract, Transform, And Load) & Data Mart	04 hours
	1. ETL, ETL Process in Data Warehouse	1
	2. Difference between ETL vs. ELT	1
	3. Introduction to Data Mart in Data Warehouse	1
	4. Types of Data Mart (Dependent, Independent & Hybrid)	1
Unit IV	Meta Data & OLAP in Data Warehouse	08 hours
	1. What is Meta Data and Categories of Metadata	1
	2.Define OnLine Transaction Processing (OLTP)	1
		1
	3. Define OLAP in Data Warehouse And OLAP vs OLTP	2
	4. Types of OLAP systems & OLAP Operations	1
		2
	6. Difference between ROLAP, MOLAP, and HOLAP	
	7. Case Studies(OLAP Operations)	
Unit V	Introduction to Data Lake & Data Warehouse Tools	04 hours
	1. Introduction to Data Lake	1
	2. Architecture of Data Lakes	1
	3. Data lake vs. Data Warehouse	1
	4. Data Warehouse Tools	1

Suggested Readings	
1.	Ralph Kimball and Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling", 3rd Edition.
2.	Nenad Jukic, "Database Systems: Introduction to Databases and Data Warehouses".
3.	Yessad, L.; Labiod, A. Comparative study of data warehouses modeling approaches: Inmon, Kimball and Data Vault
4.	LaPlante A, Sharma B (2016) Architecting data lakes. O'Reilly Media, Sebastopol, CA, USA

Website Reference Link:

- **Introduction Of Data Warehouse & Development Life Cycle:** <https://flyuptechnology.com/data-warehouse-development-life-cycle-model/>
- **Data Warehouse Concepts: Kimball vs. Inmon:** <https://www.keboola.com/blog/kimball-vs-inmon>
- **Data Warehouse Schemas:** <https://www.educba.com/data-warehouse-schema/>
- **ETL Process in Data Warehouse:** <https://www.ibm.com/topics/etl>
- **Data Mart:** <https://www.ibm.com/topics/data-mart>
- **OLAP in Data Warehouse:** https://www.tutorialspoint.com/dwh/dwh_olap.htm
- **Data Lake:** <https://www.qlik.com/us/data-lake>

S.Y.B.B.A (C.A) Lab III – Practical on Data Warehousing

2023-24 (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Lab III – Practical on Data Warehousing		Semester : III
Course Code : 23CBCA32MNB		No. of Credits : 02
Nature of Course : Minor Practical		Total Teaching Hours :60 Hrs.

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To know & understand concepts of Data Warehouse.
2.	Learn to Setup the environment for Data Warehouse Tools
3.	Maintain data quality and consistency
4.	Combine data from diverse sources

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	Student will learn to setup the environment for Data Warehouse.
2.	Using database student will learn to apply Schemas
3.	Student will learn to analyze and resolve Data Warehouse issues through hands-on exercises.

Best IDE used for Data Integration and ETL

Sr. No	Name of IDE or Tools	Latest Version
1.	Open Source Data Warehouse Tools	Apache Kylin
2.	Relational databases	SQL

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on Schemas	4
2	Assignment on OLAP Operations	4
3	Assignment on Real Time Data Processing	4
4	Assignment on ETL Process	3
	Total Number of Sessions	15

S.Y.B.B.A (C.A) Lab II – Practical on PHP

2023-24 (CBCS – Autonomy 23 Pattern)

Under NEP 2020

Course Title : Lab II – Practical on Introduction to PHP		Semester : III
Course Code : 23CBCA31VS		No. of Credits : 02
Nature of Course : VSC Practical		Total Teaching Hours : 60 Hrs

Aims & Objectives of the Course

Sr.No.	Objectives
1.	To study various PHP built-in functions and creating custom functions.
2.	To learn POST and GET in form submission
3.	To understand Read and process data in a MySQL database.

Expected Course Specific Learning Outcomes

Sr.No.	Learning Outcome
1.	Write PHP scripts to handle HTML forms.
2.	Write regular expressions including modifiers, operators, and meta characters
3.	Create PHP programs that use various PHP library functions, and that manipulate files and directories.
4.	Analyze and solve various database tasks using the PHP language

Best IDE used for PHP-Programming:

Sr. No	Name of IDE or Tools	Latest Version
1.	Microsoft Visual Studio Code 1.59	Microsoft Visual Studio Code 1.59
2.	PhpStorm	2023.3
3.	Jetbrains Fleet	1.29.213.

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on variables, number and string	1
2	Assignment on conditional statements	3
3	Assignment on Loops and Arrays	3
4	Assignment on PHP In-build functions.	3
5	Assignment on forms.	2
6	Assignment on PHP MYSQL Database	3
	Total Number of Sessions	15

Semester 4



M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : OBJECT ORIENTED PROGRAMMING USING C++		Semester : IV
Course Code : 23BCBA41MM		No. of Credits : 02
Nature of Course : Major		Total Teaching Hours : 30 Hrs

Course Objectives	
1.	Acquire an understanding of basic object oriented concepts and the issues involved in effective class design.
2.	To program using more advanced OOP's features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
3.	To enhance problem solving and programming skills in C++ by implementing the object oriented concepts.

Course Outcome	
1.	Remember the characteristics of Procedure and Object Oriented Programming Languages.
2.	Understand the fundamentals of C++ programming structure, function overloading and constructors
3.	Understanding the features of C++ Programming.
4.	Understanding the advanced features of C++ specifically, Operator Overloading, Templates, Streams.
5.	Applying the major object-oriented concepts to implement programs, Inheritance and Polymorphism.
6.	Implementing stream I/O, Files and usage of the available classes to handle stream objects.

Syllabus		
Unit I	INTRODUCTION TO C++	07 hours
	1. Basic concepts, features, advantages and applications of OOP 2. Introduction, applications and features of C++ 3. Input and Output operator in C++, Simple C++ program 4. Dynamic initialization of variables, reference variable 5. Operators: i. Scope resolution operator ii. Memory management operators 6. Manipulators 7. Inline functions, Default arguments	1 1 2 1 1 1
Unit II	CLASSES AND OBJECTS	07 hours
	1. Structure and Class, Object, Access Specifiers, defining data member 2. Defining member functions inside and outside class definition. 3. Simple C++ program using class 4. Memory allocation for objects 5. Static data members and static member functions 6. Array of objects, objects as a function argument, Friend function and Friend class 7. Function returning objects	1 1 1 1 1 1 1
Unit III	CONSTRUCTORS AND DESTRUCTORS	05 hours
	1. Constructors 2. Types of constructor : i. Default constructor ii. Parameterized constructor iii. Copy constructor 3. Constructors with default argument	1 2 1 1 1

Suggested Readings	
1.	E Balagurusamy, “Object oriented programming with C++”, Eight Edition, Mc Graw Hill Publications.
2.	Robert Lafore ,”Object Oriented Programming with C++ “, Fourth Edition, Pearson Education.
3.	Herbert Schildt,” The Complete Reference C++”, Fourth Edition, Mc Graw Hill Publications.
4.	Bhave,” Object Oriented Programming Using C++”, Pearson Education 5. Strousstrup,” The C++ Programming Language”, Third Edition, Pearson Education

Website Reference Link:

- **C++ Introduction:** https://www.w3schools.com/cpp/cpp_intro.asp
- **Learn C++ Programming:** <https://www.programiz.com/cpp-programming>
- **C++ Tutorial:** <https://www.javatpoint.com/cpp-tutorial>

S.Y.B.B.A (C.A) (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Advance PHP		Semester : IV
Course Code : 23CBCA42MM		No. of Credits : 02
Nature of Course : Major		Total Teaching Hours : 30 Hrs

Course Objectives	
1.	To know & understand concepts of internet programming.
2.	Understand how server-side programming works on the web.
3.	Understanding How to send email

Course Outcome	
1.	Students will able to implement OOP's concept in PHP
2.	. Students will able to write interactive programs using PHP.
3.	Students will able to Analyze the construction of a web page and relate how PHP and XML combine to produce the web page.
4.	Students will able to send Email using email functions
5.	Students learn different type of web services

Syllabus		
Unit I	Introduction to Object Oriented Programming in PHP	06 hours
	1. Classes	1
	2. Objects	1
	3. Introspection	2
	4. Serialization	2
	5. Inheritance	2
	6. Interfaces	
Unit II	Web Techniques	06 hours
	1. Server information	1
	2. Processing forms	1
	3. Sticky forms	2
	4. Setting response headers	2
Unit III	Working with XML and JSON	06 hours
	1. Introduction to XML	1
	2. XML document Structure	1
	3. How to Integrate PHP and XML	1
	4. How to Integrate PHP and XML	2
	6. Introduction to JSON	1
Unit IV	Introduction to Web Services	06 hours
	1. Definition of web services	1
	2. Basic operational model of web services, tools and technologies enabling web services	2
	3. Benefits and challenges of using web services.	1
	4. Web services Architecture and its characteristics	2
Unit V	Sending Emails	06 hours
	1. Configuring PHP for email	1
	2. Sending email with mail()	1
	3. Using headers	1
	4. Reviewing SMTP	2
	5. Using PHPMailer	1

Suggested Readings	
1.	VikramVaswani, “Php: A Beginner's Guide”, 1st Edition McGraw-Hill Osborne Media
2.	Joel Murach and Ray, Harris Murach’s PHP and MySQL (2nd Edition)
3.	Steven Holzner (Author), PHP: The Complete Reference Paperback – 1 Jul 2017
4.	Dr. Prashant Mulay, Prof Samad Khan, Advance PHP, 1 st Edition 2024, Nirali Publication

Website Reference Link:

- **Introduction to OOPS:** <https://www.simplilearn.com/tutorials/php-tutorial/oops-in-php>
- **Web Techniques:** https://www.tutorialspoint.com/php/php_web_concepts.htm
- **Working with XML and JSON:** <https://www.geeksforgeeks.org/how-to-display-xml-data-in-web-page-using-php/>
- **Web Services:** https://www.tutorialspoint.com/webservices/what_are_web_services.htm
- **Sending Mail :** <https://www.mailersend.com/blog/php-send-email>

**S.Y.B.B.A. (C.A) (CBCS – Autonomy 2023 Pattern)
Under NEP 2020**

Course Title: Object Oriented Software Engineering (OOSE)		Semester : IV
Course Code: 23BCA43MM		No. of Credits: 2
Course Type: Major		Total Teaching Hours: 30 Hrs.

Course Objectives	
1.	To Understand concept of system design using UML.
2.	To understand system development through object oriented techniques.
3.	To understand the Advanced concepts of OOSE

Course Outcome	
1.	Understand and effectively explain the concepts of UML
2.	Design and implement a UML Diagram.
3.	To make them aware about Advanced concepts of OOSE.

Syllabus		
Unit I	Introduction to Entity Relationship Diagram(ERD)	03
	1. Entity 2. Attribute 3. Relationship 4. Extended Features of E-R Diagram a) Generalization b) Specialization c) Aggregation (Minimum 2 case studies)	2 1
Unit II	Introduction to UML	05
	1. Introduction to UML 2. Overview of UML 3. Conceptual Model of UML 4. Architecture 5. Advantages of UML	1 1 1 1 1
Unit III	Basic and Advanced Structural Modelling	10
	1. Classes and Relationship 2. Common mechanism 3. Diagrams 4. Class diagram 5. Advanced classes 6. Advanced Relationship 7. Interface , Types and Roles 8. Packages (Minimum 2 case studies for each diagram)	1 1 1 1 1 1 1 2
Unit IV	Basic Behavioural and Architectural Modeling	10
	1. Use cases, Use Case Diagram 2. Interaction Diagram 3. Sequence Diagram 4. Activity Diagram 5. State Chart Diagram 6. Collaboration Diagram 7. Components Diagram 8. Deployment Diagram (Minimum 2 case studies for each diagram)	1 1 1 1 1 1 1 2

Unit V	Advanced Topics in Object oriented Software engineering	02
	1. Model-driven engineering(MDE) 2. Aspect-oriented software Development(AOSD) 3. Component-based software engineering(CBSE) 4. Service-oriented architecture(SOA)	1 1

Suggested Readings	
1.	Database System Concepts by Korth, Slberchatz,Sudarshan, 6th Edition, McGraw – Hill
2.	The Unified Modeling Language User Guide by Grady Booch, James Raumbaugh, Ivar Jacobson.
3.	Object Oriented Software Engineering by Ivar Jacobson
4.	Software Engineering by Pressman

Web site links and References:

- **Introduction of ER Model:** <https://www.geeksforgeeks.org/introduction-of-er-model/>
- **UML diagram:** <https://miro.com/diagramming/what-is-a-uml-diagram/>
- **Model-driven Engineering :** <https://codebots.com/app-development/what-is-model-driven-engineering>
- **Aspect-Oriented Software Development:** <https://www.techopedia.com/definition/205/aspect-oriented-software-development-aosd>
- **Component-based software engineering:** <https://www.geeksforgeeks.org/component-based-software-engineering/>
- **Service-oriented architecture:** <https://www.geeksforgeeks.org/service-oriented-architecture/>

S.Y.B.B.A (C.A) Lab I – Practical on C++

2023-24 (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Lab I- Practical on Object Oriented Programming Using C++		Semester : IV
Course Code : 23CBCA44MM		No. of Credits : 02
Nature of Course : Major Practical		Total Teaching Hours :60 Hrs.

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Identify and practice the object-oriented programming concepts and techniques To study various data types, arrays, strings and functions in C
2.	Practice the use of C++ classes and class libraries, arrays.
3.	To understand inheritance and file I/O stream concepts.

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	Creating simple programs using classes and objects in C++.
2.	Implement Object Oriented Programming Concepts in C++.
3.	Develop applications using stream I/O and file I/O.

Best IDE used for Object Oriented Programming (C++):

Sr. No.	Name of IDE or Tools	Latest Version
1.	Turbo C	3.2/3.3
2.	Microsoft Visual Studio Code	1.56
3.	NetBeans	12.4

Assignment No	Assignment Name	No. Of Sessions
1	Assignment based on Beginning with C++	1
2	Assignment based on Operators and Functions in C++	1
3	Assignment based on Classes and Objects	3
4	Assignment based on Constructors and Destructors	3
5	Assignment based on Inheritance	3
6	Assignment based on Polymorphism	2
7	Assignment based on Working with Files	2
	Total Number of Sessions	15

**S.Y.B.B.A (C.A) (CBCS – Autonomy 2023
Pattern)Under NEP 2020**

Course Title : Fundamentals of Data Integration and ETL		Semester : IV
Course Code : 23CBCA41MNB		No. of Credits : 02
Nature of Course : Minor		Total Teaching Hours : 30 Hrs.

Course Objectives	
1.	Data Integration is to leverage unified data for operational and analytical applications
2.	To familiarize with various data mining functionalities and how it can be applied to Various real-world problems.
3.	To familiarize with various machine learning algorithms used in data mining

Course Outcome	
1.	Fundamental concepts, principles, and terminology of data integration and ETL.
2.	Learn different Data Integration Techniques and ETL Tools
3.	Have some knowledge about the couple of data mining tools and how they can be used for large data.
4.	Apply data mining functionalities on real world problems and datasets.
5.	The course would help them to pursue some advance course on data science and may help in subjects like Big Data, AI etc.

Syllabus		
Unit I	Introduction to Data Integration	03 hours
	1.Importance of data integration in modern business environments.	01
	2. Exploring common challenges and solutions in data integration.	01
	3. Overview of data integration architecture and methodologies.	01
Unit II	ETL Basics	05 hours
	1. Definition and role of ETL in the data integration process.	01
	2. Detailed exploration of the Extract, Transform, Load (ETL) phases.	02
	3. Importance of ETL in the data integration lifecycle	01
	4. Introduction to ETL tools and their significance.	01
Unit III	Extracting Data, Transforming Data and Loading Data	15 hours
	1. Extracting Data	05
	i) Techniques for extracting data from different sources (databases, flat files, APIs).	
	ii) Hands-on exercises using ETL tools for data extraction.	
	iii) Data profiling and understanding source system characteristics.	05
	2. Transforming Data	
	i) Data transformation techniques, including cleaning, normalization, and enrichment.	
	ii) Introduction to data mapping and transformation rules.	05
	iii) Practical exercises using ETL tools for data transformation.	
	3. Loading Data	
	i) Understanding target systems and data storage options (data warehouses, data marts).	
	ii) Hands-on exercises on loading transformed data into target systems.	
	iii) Overview of incremental loading and data loading best practices.	
Unit IV	ETL Tool Landscape	03 hours
	1. Overview of popular ETL tools and their features.	1
	2. Comparative analysis of key tools.	1
	3. Selection criteria for choosing an ETL Tool.	1

Unit V	Data Quality in ETL and Real world Application and Industry Trends	04 hours
	1. Importance of data quality in ETL processes.	01
	2. Implementing basic data quality check.	01
	3. Introduction to data governance in ETL	01
	4. Emerging trends in Data Integration technologies.	01

Suggested Readings	
1.	"The Data Warehouse Toolkit" by Ralph Kimball and Margy Ross.
2.	"Data Integration Blueprint and Modeling" by Anthony David Giordano.
3.	"ETL Testing: A Hands-on Guide with Practical Tips and Techniques" by Vaishnavi Munipalle.

Website Reference Link:

- **Introduction to Data Integration :** <https://www.heavy.ai/technical-glossary/data-integration>
- Exploration of the Extract, Transform, Load (ETL) phases: <https://innovatureinc.com/what-is-etl-extract-transform-load/>
- **ETL in the data integration lifecycle:** <https://athena-solutions.com/essential-steps-in-the-data-integration-process>
- **Overview of popular ETL tools and their features:** <https://www.astera.com/knowledge-center/what-is-etl-tool>
- **Data Quality in ETL:** <https://arun-karunakaran.medium.com/build-quality-into-extract-transform-and-load-process-c02795ddcc93>

S.Y.B.B.A (C.A) Lab III - Practical on Data Integration and ETL

2023-24 (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Lab III - Practical on Fundamentals of Data Integration and ETL		Semester : IV
Course Code : 23CBCA42MNB		No. of Credits : 02
Nature of Course : Minor Practical		Total Teaching Hours :60 Hrs.

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To know & understand concepts of Data Integration and ETL.
2.	Learn to Setup the environment for ETL Tools
3.	Learn the Extract, Transform and Load the Data
4.	Handle the Real time Data Challenges

Expected Course Specific Learning Outcomes

Sr. No.	Learning Outcome
1.	Student will learn to setup the environment for ETL.
2.	Using database student will learn to apply extraction, transformation and Loading of data.
3.	Student will learn to analyze and resolve integration issues through hands-on exercises.

Best IDE used for Data Integration and ETL

Sr. No.	Name of IDE or Tools	Latest Version
1.	Open Source ETL Tools	Apache Kafka or NiFi
2.	Relational databases	SQL
3.	Scripting languages for data manipulation	Java Script

Assignment No.	Assignment Name	No. Of Sessions
1	Assignment on ETL Tools	3
2	Assignment on Extraction, Transformation and Loading of Data	3
3	Assignment on Real Time Data Processing	3
4	Assignment on Capstone Projects	6
	Total Number of Sessions	15

S.Y.B.B.A (C.A) Lab II – Practical on Advance PHP

2023-24 (CBCS – Autonomy 2023 Pattern)

Under NEP 2020

Course Title : Lab II – Practical on Advance PHP	Semester : IV
Course Code : 23CBCA41SC	No. of Credits : 02
Nature of Course : SEC Practical	Total Teaching Hours : 60 Hrs.

Aims & Objectives of the Course

Sr.No.	Objectives
1.	To know & understand concepts of internet programming.
2.	Understand how server-side programming works on the web.
3.	Understanding How to send email using email functions

Expected Course Specific Learning Outcomes

Sr.No.	Learning Outcome
1.	Students will able to implement OOP's concept in PHP
2.	Students will able to write interactive programs using PHP.
3.	Students will able to analyze the construction of a web page and relate how PHP and XML combine to produce the web page.
4.	Students will able to send email using php

Best IDE used for PHP-Programming:

Sr. No	Name of IDE or Tools	Latest Version
1.	Microsoft Visual Studio Code 1.59	Microsoft Visual Studio Code 1.59
2.	PhpStorm	2023.3
3.	Jetbrains Fleet	1.29.213.

Assignment No	Assignment Name	No. Of Sessions
1	Assignment on OOP's concept	4
2	Assignment on Web Techniques	4
3	Assignment on XML with PHP	4
4	Assignment on Email and SMTP	3
	Total Number of Sessions	15