ST. XAVIER'S COLLEGE JAIPUR

Department of Computer Science

(SESSION 2022-2025)

Programme Outcomes (POs) and Course Outcomes (COs)

Bachelor of Computer Applications

The students of **BCA** at the time of graduation will be able to:

PO 1 Analyze and apply fundamental knowledge and solve problems, practical and theoretical approaches.

PO 2 Investigate and evaluate new technologies and their applications.

PO 3 Utilize a variety of tools, techniques and programming languages and apply knowledge of computing, mathematics, and science to real-world problems.

PO 4 Obtain employment as computer experts in local and global industries and organizations, where they are competent in applying fundamental knowledge, computational principles and skills in computer science.

Course Outcomes

The course outcomes relating to the BCA degree programme include the following:

Year	Paper Code	Paper	Course Outcome
BCA PART I	***101(Thy)***	***Computer Fundamentals and Office Management Tools***	**CO 1.** Understand the basics of computers. **CO 2.** Understand the concept of input and output devices of Computers and how they work and recognize the basic terminology used in computer programming. **CO 3.** Identify and represent numbers in different number systems. **CO 4.** Analyze and understand in-depth training in the use of office automation packages, internet etc. **CO 5.** Enhance the ability of essential for common man for day-to-day office management, and e-governance. **CO 6.** Evaluate how to use software packages in day-to-day activities.
	102(Thy)	***Computer Organization***	**CO 1.** Identify functional units and illustrate register transfer operations. **CO 2.** Explain the internal organization of the computer and its

			instructions. **CO 3.** Make use of fixed and floating-point algorithms and analyze microprogram instructions. **CO 4.** Summarize the memory organization and pipelining concepts. **CO 5.** Illustrate data transfer between a central computer and I/O devices.
	103(Thy)	***Operating System***	**CO 1.** Describe the basics of the operating systems, and mechanisms of OS to handle processes, threads, and their communication. **CO 2.** Analyze the memory management and its allocation policies. **CO 3.** Illustrate different conditions for deadlock and their possible solutions. **CO 4.** Discuss the storage management policies concerning different storage management technologies. **CO 5.** Evaluate the concept of the operating system with respect to UNIX, Linux, Time, and mobile OS.
	104 (Thy)	***Principles of Programming Language through C***	**CO 1.** Understand the basics of programming language. **CO 2.** Understand the basics of algorithms and flowcharts. **CO 3.** Write, compile and debug programs in C language. **CO 4.** Understand, explain, and use different data types and operators to write programs. **CO 5.** Formulate, evaluate, and analyze the problems by applying programming concepts using decision control statements and loop control statements. **CO 6.** Formulate the problem by applying the programming concepts using array, structure, pointer and functions.
	105 (Thy)	***Web Application Development***	**CO 1.** Describe the basics of the Internet and concepts like Internet service providers, internet connections, and Internet protocols. **CO 2.** Discuss basics of e-mail, mailing lists, newsgroups, Internet relay chat, and instant messaging. **CO 3.** Describe Internet services: Telnet,

			FTP, and the Web. **CO 4.** Analyze a web page and identify its elements and attributes. **CO 5.** Create web pages using HTML and Cascading Style Sheets. **CO 6.** Build dynamic web pages using JavaScript (Client-side programming).
	106 (Thy)	***Basic Mathematics***	**CO 1.** Identify matrix operations. **CO 2.** Understand the meaning of limit, continuity, and differentiation. **CO 3.** Evaluate a definite integral using the Fundamental Theorem of Calculus. **CO 4.** Identify a general method for constructing solutions to inhomogeneous linear constant-coefficient Second-order equations. **CO 5.** Demonstrate Scalar multiplication, magnitude, Vector multiplication and Simple application of Vectors, the slope of a straight line, centre, radius, and the equation of a circle.
	107(Prac)	***Office Management Tools Lab***	**CO 1.** Understand the basic features of Microsoft Office, Windows basics, and file management. **CO 2.** Develops familiarity with Word, Excel, Access, PowerPoint, email, and Internet basics. **CO 3.** Recognize when to use each of the Microsoft Office programs to create professional and academic documents. **CO 4.** Use Microsoft Office programs to create personal, academic, and business documents following current professional and/or industry standards.
	108 (Prac.)	***C Programming Lab***	**CO 1.** Identify different programming approaches in procedural programming. **CO 2.** Analyze and critically evaluate various programming approaches which will help in the implementation of different applications or projects. **CO 3.** Select and implement different programming approach concepts in project or application development.

			CO 4. Demonstrate awareness of the programming paradigm in terms of understanding the concept of application development.
	109(Prac)	***Web Application Development Lab***	**CO 1.** Understand, analyze, and apply the role of languages like HTML, CSS, and JavaScript in web development. **CO 2.** Analyze and explore a web page and identify its elements and attributes. **CO 3.** Design static web pages using HTML and CSS. **CO 4.** Create dynamic web pages using JavaScript.
	110(Prac)	***Communication Skills Lab***	**CO 1.** Effectively communicate through verbal/oral communication and improve listening skills. **CO 2.** Write precise briefs or reports and technical documents. **CO 3.** Actively participate in group discussions/meetings/interviews and prepare & deliver presentations. **CO 4.** Become an effective individual through goal/target setting, self-motivation and practising creative thinking. **CO 5.** Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, Interpersonal relationships, conflict management and leadership quality.
BCA II	***201(Thy)***	***Object Oriented Programming (C++)***	**CO 1.** Investigate different concepts of programming approaches in terms of the application or project development. **CO 2.** Create methods and programs within the field of procedural programming as well as develop logical and analytical approaches to programming problems independently. **CO 3.** Apply his/her knowledge in new areas within the field of basic and advanced programming. **CO 4.** Develop independently relevant applications using self-logic in the

			field of programming languages. These methods include performing experiments/programs and interpreting their results.
	202 (Thy)	***Database Management System***	**CO 1.** To investigate what databases are, different types of databases, and why they are valuable assets for decision making. **CO 2.** Develop normalization and ER modelling that are used concurrently to produce a good database design. **CO 3.** Recognize the relationships among entities and the attributes of those entities, and in designing an entity relationship diagram to capture those relationships. **CO 4.** Develop a set of queries to handle a specified set of typical user inquiries for information extraction from the database.
	203(Thy)	***Software Engineering***	**CO 1.** To define basic concepts of software development such as requirement analysis, designing, testing, and debugging etc. **CO 2.** To explain different types of models that can be used to design software. **CO 3.** To design solutions to a given problem and analyze the best one based on parameters like cost, time, and knowledge. **CO 4.** To apply the various testing techniques and testing tools. **CO 5.** To explain the importance of reliability in software development.
	204(Thy)	***Data Structure and Algorithm***	**CO 1.** Students will be able to use linear and non-linear data structures like stacks, queues, linked lists etc. **CO 2.** Define basic static and dynamic data structures and relevant standard algorithms for them: stack, queue, dynamically linked lists, trees, graphs, heap, priority queue, hash tables, sorting algorithms, and min-max algorithm. **CO 3.** Students will be able to choose appropriate data structures as

			applied to specified problem definitions. **CO 4.** Students will be able to handle operations like searching, insertion, deletion, and traversing mechanism
	205(Thy)	***Cloud Computing***	**CO 1.** Investigate different concepts of cloud computing in terms of an individual and organization. **CO 2.** Create theories, methods and interpretations of theories within the field of cloud computing as well as solve theoretical and practical problems independently. **CO 3.** Apply his/her knowledge in new areas within the field of cloud computing. **CO 4.** Develop web applications using the concept of cloud computing.
	207(Thy)	***Object Oriented Programming (C++)Lab***	**CO 1.** Read and understand Object oriented-based software code of medium-to-high complexity. **CO 2.** Use standard and different types of Object-oriented libraries when required for implementation. **CO 3.** Understand the basic principles of creating Object-oriented applications or programs. **CO 4.** Understand the fundamental concepts of computer science: structure of the computational process, algorithms, and complexity of computation.
	208(Thy)	***Database Management System Lab***	**CO 1.** Understand, the underlying concepts of database technologies, design and implement a database schema for a given problem domain, and normalization techniques. **CO 2.** Populate and query a database using SQL DML/DDL commands, enforce integrity constraints on a database **CO 3.** Concept of transaction and concurrency, understand database concepts and structures. **CO 4.** Understand the objectives of data and information management, understand data modelling and database development process. **CO 5.** Construct and normalize conceptual data models.

			Implement a relational database into a database management system.
	209(Prac)	***Data Structure and Algorithm Lab***	**CO 1.** Investigate different concepts of Data Structure in terms of application or project development. **CO 2.** Create methods and programs within the field of procedural programming as well as develop logical and analytical approaches to programming problems independently. **CO 3.** Apply his/her knowledge in new areas within the field of basic and advanced programming. **CO 4.** Develop independently relevant applications using self-logic in the field of programming languages. These methods include performing experiments/programs and interpreting their results.
	A01(Elective)	***.NET***	**CO 1.** Understand the basic structure of C# and .Net Programming. **CO 2.** Understand the basic Libraries and their functions. **CO 3.** Understand the basic concepts underlying the ASP.net and C#.net **CO 4.** Understand the basic concepts of the .NET framework and compact framework.
	A02 (Elective)	***PHP***	**CO 1.** To implement PHP script using Decisions and Loops. **CO 2.** To develop PHP applications using Strings, Arrays and Functions. **CO 3.** To design object-oriented programming (OOP) principles for PHP and use HTML form elements that work with any server-side language. **CO 4.** To display and insert data using PHP and MySQL
	A03 (Elective)	***Data Science***	**CO 1.** Understand basic concepts and associated terminology of data science. **CO 2.** Identify and appropriately acknowledge sources of data. **CO 3.** Apply basic data cleaning techniques to prepare data for analysis and presentation as part of the data science process.

			CO 4. Apply appropriate descriptive and inferential methods to summarize data and identify associations and relationships as part of data analytics. **CO 5.** Recognize, describe, and calculate the measures of location of data, centre of data, and spread of data. **CO 6.** Use appropriate data science tools and technology to collect, process, transform, summarize, and visualize data.
	B01(Prac) (Elective)	***.NET Lab***	**CO 7.** Demonstrate an understanding of C# syntax through program design. **CO 8.** Develop a working knowledge of C# programming constructs and the .NET Framework. **CO 9.** Write an object-oriented program using custom classes. **CO 10.** Build and debug well-formed Web Forms with ASP. NET Controls. **CO 11.** Create custom controls with user controls. **CO 12.** Use ADO.NET in a web application to read, insert, and update data in a database.
	BO2 (Prac) (Elective)	***PHP Lab***	**CO 1.** Analyze PHP scripts and determine their behaviour. **CO 2.** Construct PHP scripts to create dynamic web content. **CO 3.** Create PHP scripts capable of inserting and modifying data in a MySQL database. **CO 4.** Design web pages with the ability to retrieve and present data from a MySQL database.
BCA III	***301 (Thy)***	***JAVA***	**CO 1.** Understand the basic principles of OOP and Java Programming. **CO 2.** Analyze various techniques and methods used in Java. **CO 3.** Implement the various concepts of Java to solve problems. **CO 4.** Develop Web and Desktop Applications using Java.
	302 (Thy)	***PYTHON***	**CO 1.** To learn how to use lists, tuples, and dictionaries in Python programs and identify Python object types. **CO 2.** To learn how to use indexing and slicing to access data in Python

			programs. **CO 3.** Use if-else statements and switch-case statements to write programs in Python to tackle any decision-making scenario. **CO 4.** To learn how to read and write files in Python. **CO 5.** Develop cost-effective robust applications using the latest Python trends and technologies. **CO 6.** Build the system's entire web development process using various tools.
	303(Thy)	***Data Communication & Networking***	**CO 1.** Understand the concept of Signals, OSI & TCP/IP reference models and discuss the functionalities of each layer in these models. **CO 2.** Discuss and analyze flow control and error control mechanisms and apply them using standard data link layer protocols. **CO 3.** Design subnets and calculate the IP addresses to fulfil the network requirements of an organization. **CO 4.** Analyze and apply various routing algorithms to find shortest paths for packet delivery. **CO 5.** Explain the details of Transport Layer Protocols (UDP, TCP) and suggest appropriate protocols for reliable/unreliable communication. **CO 6.** Analyze the features and operations of various application layer protocols such as HTTP, DNS and SMTP.
	304(Thy)	***Artificial Intelligence***	**CO 1.** Identify basic concepts and scope of Artificial Intelligence **CO 2.** Compare different AI search techniques and apply them to real-world problems. **CO 3.** Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation, and reasoning. **CO 4.** Develop intelligent algorithms for constraint satisfaction problems and design intelligent systems for Game Playing. **CO 5.** Classify different learning paradigms and their application in

			Neural Networks. **CO 6.** Explain concepts of Natural Language processing and discuss Expert systems.
	305 (Thy)	***Digital Marketing***	**CO 1.** Understand the concept of digital marketing and its real-world iterations. **CO 2.** Articulate innovative insights into digital marketing enabling a competitive edge. **CO 3.** Understand how to create and run digital media-based campaigns. **CO 4.** Identify and utilize various tools such as social media etc. **CO 5.** Recognize ethical and moral issues, identify needed actions, and demonstrate the moral courage to implement them.
	307(Prac)	***JAVA Lab***	**CO 1.** Identify the core concepts of Information Technology, both theoretical and applied. **CO 2.** Investigate new technologies, tools, practices, and standards, and relate them to their knowledge domain. **CO 3.** Acquaint with design and development tools and engage in systematic evaluation using current methodologies. **CO 4.** Demonstrate the ability to integrate IT knowledge and develop industry-oriented projects.
	308(Prac)	***Python Lab***	**CO 1.** Understand the basic concepts of scripting and the contributions of scripting language. **CO 2.** Explore Python data structures like Lists, Tuples, Sets and dictionaries. **CO 3.** Create practical and contemporary applications using Functions, and Regular Expressions. **CO 4.** Ability to learn how to read and write files in Python.
	309 (Prac)	***Digital Marketing Lab***	**CO 1.** Learn digital marketing tools like search engine optimization and associated analytics. **CO 2.** Apply digital marketing tools to a) improve websites' rankings and optimize them in the process. b) Improve the brand's visibility c) improve the reach of brands which

			physically is relatively difficult and less effective. **CO 3.** Analyze the relative importance of digital marketing strategies to optimize digital marketing campaigns. **CO 4.** Evaluate the performance of different social media in conjunction with the overall digital marketing plan. **CO 5.** Design search engine optimization and search engine marketing campaigns
	C01 (Elective)	***Data Warehousing and Data Mining***	**CO 1.** Understand the principles of Data warehousing and Data Mining. **CO 2.** Familiar with the Data warehouse architecture and its Implementation. **CO 3.** Know the Architecture of a Data Mining system. **CO 4.** Understand the various Data preprocessing Methods. **CO 5.** Perform classification and prediction of data.
	C02 (Elective)	***Network Security and Cryptography***	**CO 1.** Understand basic security terminologies. **CO 2.** Classify the encryption techniques. **CO 3.** Illustrate various public key cryptographic techniques. **CO 4.** Evaluate the authentication and hash algorithms. **CO 5.** Discuss authentication applications. **CO 6.** Understand basic concepts of system and web security.
	C03 (Elective)	***Machine Learning***	**CO 1.** Understand different types of machine learning techniques and their applications in the real world. **CO 2.** Apply various mathematical models for supervised machine learning models. **CO 3.** Apply and evaluate the unsupervised machine learning models through various clustering algorithms. **CO 4.** Evaluate various machine learning algorithms through statistical learning techniques. **CO 5.** Apply probabilistic graphical models to represent complex systems and make predictions

			based on uncertain data. **CO 6.** Apply reinforcement learning algorithms to solve real-time complex problems with an understanding of the trade-offs involved.

➢ Course Map

The course map indicates the linkage between course outcomes and programme outcomes of BCA (Table 1).

Table 1: Course Map BCA

PSO	COURSE OUTCOME																																							
	PART I										PART II															PART III															
	101	102	103	104	105	106	107	108	109	110	201	202	203	204	205	207	208	209	ELECTIVE						301	302	303	304	305	307	308	309	ELECTIVE								
																			AO1	AO2	AO3	BO1	BO2	BO3									AO1	AO2	AO3	BO1	BO2	BO3			
1	x	x	x	x	x							x	x	x	x				x	x	x				x	x	x	x	x				x	x	x						
2						x												x									x	x	x	x	x	x	x	x	x	x	x	x			
3				x			x	x	x		x	x				x	x	x	x		x	x	x	x	x				x	x	x	x				x	x	x			
4					x					x					x				x	x	x	x	x	x		x			x	x	x	x				x	x	x			