JAGAT GURU NANAK DEV
PUNJAB STATE OPEN UNIVERSITY, PATIALA
A State University Established by Govt. of Punjab vide Act No. 19 of 2019 and Approved Under section 2(f) of UGC

School of Sciences & Emerging Technologies

PPR for the Programme

4-Years BCA (Honours)

From Admission Cycle: July 2024

28/01/25

PROGRAMME PROJECT REPORT OF
4-Years BCA (Honours)

1. Introduction

The school of Sciences & Emerging Technologies of Jagat Guru Nanak Dev Punjab State Open University, Patiala has planned to start Bachelor of Computer Applications from the session 2024-25. The university has adopted choice-based credit system that has been introduced by University Grant Commission (UGC). This is a broad-based Programme covering disciplinary, interdisciplinary and skill-based courses. The Bachelor of Computer Applications has 182 credits consisting of 8 categories namely Major (Core) Courses, Minor Stream Courses, Multidisciplinary Courses, Ability Enhancement Courses, Skill Enhancement Courses, Value Enhanced Courses, Summer Internship, Research Project. This 4-Years Programme has 8 semesters.

2. Programme Mission & Objectives

2.1 Mission Statement

To educate learners with high quality theoretical, practical, ethical, technological and skill-oriented education in the area of computer science and other related disciplines that can help them in their professional career and prepare them for academics, industry and research.

2.2 Objectives

The Programme has been framed to achieve the following main objectives:

- To develop an understanding and knowledge of the fundamentals of computer science with good foundation on theory, systems and applications.
- To apply computer science theory and software development concepts to construct computing-based solutions.
- To become technology-oriented learners with the knowledge and ability to develop innovative solutions.
- To provide some development experience within a specific field of computer science, through project work.
- To provide the knowledge about the recent developments in IT, future possibilities and limitations, and understand the value of lifelong learning.

- To enhance the computing, management, communication and soft skills of learners through project work and seminars.

3. Relevance of the Programme

In this age of computers and everything being digitalized, knowledge about computer technology is very important. Presently, computer scientist is one of the fastest-growing job titles in the industry. To cater the need of the industry, a Programme in Computer Science will prove to be very helpful for learners and professionals those want to take up the job in the field of computer science. A 4 Years degree Programme in Computer Applications will provide foundation skills and information not only about Computer Science but also in the related fields, this will give a strong foundation to the learner. One also gets to learn programming languages used in Computer Science along with information about various tools and approaches used in Computer Science. The Bachelor Programme in Computer Applications of Jagat Guru Nanak Dev Punjab State Open University has been designed to supply trained man power in ever-growing IT and IT enabled industry. Main goal of BCA Programme is to prepare learners for training in some specialized area of computer science, to prepare learners for jobs in IT industry, business or government, and to provide support courses for learners in the field of engineering, mathematics and management to enhance the computing, management, communication skills of learners.

4. Prospective Target Group

- Having passed 10+2 in any Stream or the equivalence examination or the higher examination from the recognized Board/University.
- Having passed 2 Years ITI Programme in any trade after Matriculation from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such examination from any other recognized State Board of Technical Education.
- Having passed 3 Years Diploma in any stream after Matriculation from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such examination from any other recognized State Board of Technical Education.

Learners with above said eligibility may join this course to improve their knowledge, skills, employability, and entrepreneurship ability. The working persons and who cannot study through regular mode can continue their education through this open distance learning mode.

5. Appropriateness of the Programme

The Programme will provide academic continuity to the learning community and will facilitate continuous professional development for the employees and entrepreneurs across the country and Punjab state, in particular. The Programme aims to reach the learners who are distant and those lacking access. To reach the unreached, the courses' instructions and specially prepared study material in the form of printed notes and audio-video lessons to the learners will be delivered at their door steps through postal correspondence and digital media like e-mail, website etc. Limited face-to-face contact sessions will be held at Learner Support Centres (LSC) set up by the university as close as possible to the learner's home. Communication with the university and interaction between the teacher and the learners will be further facilitated using electronic media options like telephone, e-mails, chat sessions, video conferencing and tele conferencing, if and when required. All of these characteristics will help learners to engage in relevant, purposeful and interesting lessons.

Apart from this, the learners will have the advantage to study at their own pace and convenience as the Programme can be completed in the time span ranging from four years to seven years.

The multiple exit and enter option for learners is facilitated. Learners are allowed to exit the Programme with a relevant Certificate/Diploma/Degree and re-enter the same Programme at a later time. The award of Certificate/Diploma/Degree is as follows:

Level	Name of Programme	Duration of the Programme	Remarks
Level 4.5	**Undergraduate Certificate in Computer Applications** after completing 1 year (2 semesters) of study	1 Year	Learners who opt to exit after completion of the first year and have secured 50 Credits will be awarded a UG Certificate. These learners are allowed to re-enter the degree Programme within three years and complete the degree Programme within the stipulated maximum period of seven years
Level 5	**Undergraduate Diploma in Computer Applications** after 2 years (4 semesters) of study	2 Years	Learners who opt to exit after completion of the second year and have secured 96 Credits will be awarded the UG Diploma.

			These learners are allowed to re-enter within a period of three years and complete the degree Programme within the maximum period of seven years.
Level 5.5	**Bachelor in Computer Applications** after 3 years (6 semesters) of study	3 Years	Learners who wish to undergo a 3-year UG Programme will be awarded UG Degree, Bachelor in Computer Applications after successful completion of three years, securing 136 Credits
Level 6	**Bachelor in Computer Applications (Honours)** after 4 years (8 semesters) of study	4 Years	A four-year UG Honours degree (Bachelor in Computer Applications (Honours)) will be awarded to those who complete a four-year degree Programme with 182 Credits. Learners who secure 75% marks and above in the first six semesters can opt for the Honours.

6. Instructional Design

The Bachelor of Computer Applications is a broad-based Programme covering disciplinary, interdisciplinary and skill-based courses. This Programme has 182 credits consisting of 8 categories namely Major (Core) Courses, Minor Stream Courses, Multidisciplinary Courses, Ability Enhancement Courses, Skill Enhancement Courses, Value Enhanced Courses, Summer Internship, Research Project. This 4-Years Programme has 8 semesters.

The Programme can be completed in a minimum 4 Years period or maximum 7 Years period. This Programme is designed to provide the learners with the information and skills necessary to understand and analyze their world by introducing them to the main themes and topics of disciplines in Computer Science, IT, Mathematics and Management. The Programme Code of BCA Programme is BCA.

Note: The Programme can be completed by earning the required number of credits in a minimum period of 4 Years (8 Semesters) or in the maximum period of 7 Years. The required number of credits is 182. A credit is equivalent to 30 hours of study time comprising all learning activities (i.e., reading and comprehending the print material, listening to audios, watching videos, attending counseling sessions, teleconferencing and writing assignment responses). The Programme has a mix of different types of courses in each of the eight semesters. Table I & Table II gives an

overview of the Programme structure showing the distribution of different types of courses across the eight semesters of the Programme.

Most courses of this Programme are of four credits. This means that you will have to put in 120 hours (4x30) of study time to complete each of these courses. Laboratory related courses are of 2 credits. The Programme has a mix of different types of courses in each of the eight semesters.

7. Procedure for Admissions

Notifications regarding admission will be published in the leading national and regional newspapers. In addition to this, all the required information will be updated regularly on the university website.

7.1 Programme Duration: 4 Years to 7 Years

7.2 The Medium of Examination: English

7.3 Eligibility:

- Having passed 10+2 in any Stream or the equivalence examination or the higher examination from the recognized Board/University.
- Having passed 2 Years ITI Programme in any trade after Matriculation from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such examination from any other recognized State Board of Technical Education.
- Having passed 3 Years Diploma in any stream after Matriculation from Punjab State Board of Technical Education & Industrial Training, Chandigarh or such examination from any other recognized State Board of Technical Education.

7.4 Total Programme Fee:

Fee Head Details	Sem-I	Sem-II	Sem-III	Sem-IV	Sem-V	Sem-VI	Sem-VII	Sem-VIII
Registration/ Continuation Fee	500		500		500	--	500	
Tuition Fee	4000	4000	4000	4000	4000	4000	4000	4000
Examination Fee	1250	1250	1250	1250	1250	1250	1250	1250
I.T. and other Charges	750	750	750	750	750	750	750	750
Security Fee (Refundable)	--		--		--	--		
Total Fee (Rs.)	6500	6000	6500	6000	6500	6000	6500	6000

Note:

- The Fee can be change at any point of time, as per the recommendations of academic and concerned committee

7.5 Instructional Delivery Mechanisms:

The Programme has been designed with the aim to reach the distant and those lacking access to a regular mode of education. The courses' instructions and specially prepared study material will be made available through Learner Support Centres (LSCs) and digital media like e-mail, website etc. Limited face to face contact sessions will be held at the study centers set up by the university as close as possible to the learner's home. Communication with the university and interaction between the teacher and the learners will be further facilitated using electronic media options like telephone, e-mails, chat sessions, video conferencing and tele conferencing, if and when required. Besides this, Counseling Sessions will be held at all the LSCs regularly during weekends. The university will also conduct live/virtual classes for learners using modern ICT methods. However, to ensure learner participation and interaction, online classes will be blended with face to face discussions and meetings with the learners.

8. Evaluation

The learners' progress is measured through the means of continuous evaluation and end semester examinations.

8.1 Continuous Internal assessment through assignments

Assignments help the learners to recapitulate the theory and go back to the text again in case they are unable to answer a particular question. Thus, assignments also help to reinforce learning in distance and open learning system of education. The assignments will consist of a set of questions and activities that have to be answered by the Programme participants by remaining at their own place.

Four assignments will be submitted for a 4 credits course and two assignments will be submitted by the learner for a 2 credits course. The assignments will cover all or any types of questions (long answer type, short answer type, objective type, multiple choice questions and case studies). Learners will be required to obtain 40% marks as pass percentage in each assignment separately. Each assignment will carry 50 marks. In the final result, assignments will carry 30% weightage.

8.2 Semester End Examination

Semester end examination is the major component of the evaluation system and carries 70% weightage in the final result. The university will conduct end semester examination twice a year i.e., in June and in December. The learners can take the examination only after the completion of the course, failing which they can take the same in December or June of subsequent years but within the total span of the Programme. In case any student fails to get a passing score in the semester end examination, they will be eligible to reappear in the next semester end examination for that course as and when it is held but within the total span of the Programme only.

In order to claim Bachelor of Computer Applications, the learner is required to score at least 40% marks in both continuous evaluations (i.e., in assignments) as well as in semester end examinations separately.

8.3 Updated Notification for the Learners

The information regarding the university policies and procedures, academic activities like assignment submissions, question papers, results and other notices related to examination and evaluation will be uploaded on the official website of the university.

9. Laboratory Support

Modernize Computer Labs at the Learner Support Centres (LSCs) will be provided with all latest computers and software required for this Programme.

10. Library Resources

The students may avail the library facilities at their Learner Support Centres (LSCs).

11. Cost Estimation

The cost of the Programme will be as per the fee decided upon.

12. Quality Assurance Mechanism

The university has constituted a "Centre of Internal Quality Assurance (CIQA) as per UGC (Open and Distance Learning) Regulations, 2020.

13. Programme Outcomes (POs)

Programme: Bachelor of Computer Applications

Programme Outcomes (POs)

On successful completion of this Programme, the students will be able to:	
PO1	Demonstrate a sound understanding of the principles and concepts of computer science and its applications.
PO2	Analyze requirements, design software systems, and develop applications using appropriate methodologies and tools.
PO3	Design, implement, and manage databases, including performing database queries, normalization, and optimization.
PO4	Apply knowledge of computing and mathematics appropriate to the discipline to solve complex computing problems.
PO5	Communicate effectively with a range of audiences, both orally and in writing.
PO6	Understand computer networks, protocols, and security principles to design and implement secure and reliable networked systems.
PO7	Develop and implement effective testing strategies to ensure the quality and reliability of software applications.
PO8	Demonstrate knowledge and understanding of management principles and apply these to one's own work, as a member and leader in a team, to manage projects in a multidisciplinary environment.
PO9	Recognize the need for, and have the ability to engage in, continuing professional development.
PO10	Understand and adhere to ethical standards in the field of computing, as well as have knowledge of legal considerations related to software development and usage.

14. Programme Specific Outcomes (PSOs)

Programme: Bachelor of Computer Applications

Programme Specific Outcomes (PSOs) On successful completion of this Programme, the students will be able to:	
PSO1	Develop software applications using programming languages and tools relevant to the field of computer applications.
PSO2	Design, implement, and administer databases efficiently, demonstrating expertise in database management systems, normalization, and performance optimization.
PSO3	Understand the computer networks , configure and manage networked systems.
PSO4	Understand the information security principles and implement security measures in software applications and systems.
PSO5	Identify and solve complex problems related to software development and computer applications.

15. Course Outcomes (COs)

Course#1

Course: Computer Programming
Course Code: BCA-1-01T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Gain a solid understanding of the fundamental concepts of programming in the C language, including variables, data types, control structures (such as loops and conditional statements), functions, and arrays.
CO2	Develop the ability to solve problems using C programming constructs, including the design and implementation of algorithms.
CO3	Acquire practical programming skills in C, including writing, compiling, debugging, and testing C programs.
CO4	Understand and apply best practices for C programming, including code readability, documentation, and code reuse.
CO5	Learn how to read from and write to files using C, including concepts such as file pointers and file I/O operations.

Course#2

Course: Fundamentals of Computer	
Course Code: BCA-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Learn the basic knowledge of computer hardware and software
CO2	Get basic knowledge of number system
CO3	Gain knowledge of computer languages such as machine language, assembly language, high level language, 4GL.
CO4	Learn hands on experience with operating systems
CO5	Learn the computer networks, Information Technology and Society

Course#3

Course: Probability & Statistical Analysis	
Course Code: BCA-1-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Apply measures of central tendency for analysis of data.
CO2	Learn tabulated and graphical representation techniques for discrete and continuous data.
CO3	Infer the concept of correlation and regression for two or more related variables.
CO4	Understand the fundamentals of statistics to apply descriptive measures and probability for data analysis.
CO5	Understand the concepts of Random Variable, Probability Mass Function and Density Function.

Course#4

Course: Computer Programming Lab	
Course Code: BCA-1-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop C programs to solve simple mathematical and decision making problems.

CO2	Develop, Debug and Execute programs to demonstrate the applications of arrays in C
CO3	Develop, Debug and Execute programs to demonstrate decision making and looping constructs in C
CO4	Develop, Debug and Execute programs to demonstrate the basic concepts of pointers in C
CO5	Implement programs to read from and write to files using C, including concepts such as file pointers and file I/O operations.

Course#5

Course: Basic Communication Skills	
Course Code: BCS-2-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain competence in verbal and non-verbal communication
CO2	Increase comprehension levels
CO3	Use language for effective communication
CO4	Understand the processes of communication
CO5	Overcome barriers in communication

Course#6

Course: Sikh Heritage and Ethos	
Course Code: BCA-1-VEC-1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a comprehensive understanding of the beliefs, practices, and history of Sikhism, including its origins, scriptures, and key principles.
CO2	Understand the historical context in which Sikhism emerged, including the life and teachings of the Sikh Gurus, the development of the Sikh community, and key historical events.
CO3	Develop an appreciation for the core values of Sikhism, such as equality, justice, compassion, and service to others.
CO4	Understand Sikh cultural practices, traditions, and contributions to art, music, literature, and architecture.
CO5	Develop an understanding of Sikhism in relation to other faith traditions, as well as the importance of interfaith dialogue and cooperation.

Course#7

Course: Operating Systems
Course Code: BCA-2-01T
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Understand the structure of computing systems, from the hardware level through the operating system level and onto the applications level.
CO2	Understand basics of operating system viz. system programs, system calls, user mode and kernel mode.
CO3	Learn the working with CPU scheduling algorithms for specific situation, and analyze the environment leading to deadlock and its rectification.
CO4	Explore the memory management techniques viz. caching, paging, segmentation, virtual memory, and thrashing.
CO5	Apply Methods for Handling Deadlocks, Deadlock Prevention, and Recovery from Deadlock.

Course#8

Course: Python Programming	
Course Code: BCA-2-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic syntax and structure of Python programs.
CO2	Understand variables, data types, and basic operations.
CO3	Understand and use common programming constructs like loops and conditionals.
CO4	Define and use functions in Python.
CO5	Understand the basics of object-oriented programming in Python.

Course#9

Course: Digital Marking	
Course Code: FDM-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify the core concepts of digital marketing and its role in businesses or organizations.
CO2	Understand digital marketing strategies to reach the target audience.
CO3	Analyze marketing approaches and recognize areas for enhancing performance.
CO4	Resolve digital marketing issues and offer solutions based on the vital examination of digital marketing information.
CO5	Work on social media platforms such as Twitter, Facebook and Instagram

Course#10

Course: Operating Systems Lab	
Course Code: BCA-2-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate the installation process of various operating systems.

CO2	Implement virtualization by installing Virtual Machine software.
CO3	Apply UNIX/LINUX operating system commands.
CO4	Understand different UNIX/LINUX shell scripts
CO5	Implement and execute various shell programs.

Course#11

Course: Python Programming Lab	
Course Code:BCA-2-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate proficiency in writing Python code to solve simple problems.
CO2	Use and manipulate basic data structures in Python, such as lists, tuples, and dictionaries.
CO3	Solve algorithmic problems using Python.
CO4	Utilize common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation).
CO5	Use libraries for data manipulation, analysis, and visualization.

Course#12

Course: Environmental Studies	
Course Code: BCA-2-ENVS	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a broad understanding of key environmental challenges, such as climate change, pollution, biodiversity loss, and resource depletion.
CO2	Understand the interconnected nature of environmental, social, economic, and political systems, and how they influence each other
CO3	Understand of natural systems, including ecosystems, and how they function, as well as human impacts on these systems.
CO4	Understand of sustainability principles and practices, including the ability to analyze and evaluate sustainability initiatives.
CO5	Knowledge the environmental laws, policies, and governance structures at local, national, and international levels.

Course#13

Course: Human Rights and Duties	
Course Code: BCA-2-VEC-2	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a comprehensive understanding of human rights principles, including the Universal Declaration of Human Rights and other relevant international and regional instruments.

CO2	Understand the legal frameworks and mechanisms for protecting human rights at the international, regional, and national levels.
CO3	Understand the historical development of human rights concepts and movements, including key events and figures.
CO4	Analyze human rights issues and challenges, including discrimination, inequality, and violations of human rights.
CO5	Develop skills in advocating for human rights and engaging in activism to promote and protect human rights.

Course#14

Course: DBMS	
Course Code: BCA-3-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental elements of database management system.
CO2	Understands the three level architecture of DBMS and mapping between these levels.
CO3	Familiar with the hierarchical model, network model, entity relationship model and relational model.
CO4	Acquire knowledge of normalization technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies.
CO5	Apply SQL and PL/SQL to solve problems

Course#15

Course: Data Structures	
Course Code: BCA-3-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand basic data structures such as arrays, linked lists, stacks and queues.
CO2	Solve problem involving graphs, trees and heaps.
CO3	Apply stack for evaluation of arithmetic expressions, and conversion from infix to post fix and recursion.
CO4	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO5	Design algorithm in context of space and time complexity and apply asymptotic notation.

Course#16

Course: Computer System Architecture	
Course Code: BCA-3-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the organization of basic computer , its design and the design of control unit.

CO2	Demonstrate the working of central processing unit and RISC and CISC Architecture.
CO3	Describe the operations and language of the register transfer, micro operations and input- output organization.
CO4	Understand the organization of memory and memory management hardware.
CO5	Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and synchronization.

Course#17

Course: Introduction to Data Science	
Course Code: BCA-3-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand tools and techniques to analyze and extract insights from data received from different data sources such as social media, IoT devices, and sensors.
CO2	Understand the general techniques and frameworks that can be used to handle special types of data, such as acoustic, image, sensor, and network data
CO3	Apply mathematical or logical operations to the data to derive new insights.
CO4	Apply tools for understanding complex data structures and relationships.
CO5	Explore various applications of data science in the field of business, energy, health care, biotechnology, manufacturing, telecommunication, pharmaceuticals etc.

Course#18

Course: DBMS Lab	
Course Code: BCA-3-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement Basic DDL, DML and DCL commands.
CO2	Understand Data selection and operators used in queries and restrict data retrieval and control the display order.
CO3	Use Aggregate and group functions to summarize data.
CO4	Join multiple tables using different types of joins.
CO5	Understand the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.

Course#19

Course: Data Structures Lab	
Course Code: BCA-3-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement basic data structures such as arrays and linked list.
CO2	Develop programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO3	Implement various searching and sorting algorithms.
CO4	Develop programs to demonstrate the implementation of various operations on stack

CO5	Develop programs to demonstrate the implementation of various operations on queue

Course#20

Course: Drug Abuse: Problem, Prevention and Management	
Course Code: BCA-3-VEC-3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a comprehensive understanding of the nature and scope of drug abuse, including the factors contributing to it and its impact on individuals and society.
CO2	Learn about various strategies and interventions aimed at preventing drug abuse, both at the individual and community levels
CO3	Develop skills in managing and treating drug abuse, including understanding different treatment approaches, such as behavioral therapies and medication-assisted treatments.
CO4	Gain an understanding of the legal and ethical issues related to drug abuse, including laws and regulations governing drug use and treatment.
CO5	Develop the ability to assess and evaluate drug abuse problems, interventions, and prevention programs to determine their effectiveness.

Course#21

Course: Software Engineering	
Course Code: BCA-4-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the software development life cycle which increases the growth opportunity.
CO2	Learn the detail knowledge of software requirement analysis.
CO3	Understands the detailed knowledge of software design and coding.
CO4	Understand the software testing that is relevant to the industry.
CO5	Acquire the detail knowledge of the fundamentals, including terminology; the nature and need for maintenance; maintenance costs and software evolution

Course#22

Course: Computer Networks	
Course Code: BCA-4-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Build an understanding of the fundamental concepts of computer networking.
CO2	Identify the different types of network topologies and protocols.
CO3	Understand the concept of networking models, protocols, functionality of each layer
CO4	Identify the function of a firewall, and how it keeps a computer secure and safe from viruses.
CO5	Understand the concept of Firewalls for Network Security.

Course#23

Course: Object Oriented Programming	
Course Code: BCA-4-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop understanding of writing object-oriented programs that combine functions and data.
CO2	Gain a thorough understanding of the core principles of OOP, including encapsulation, inheritance, and polymorphism.
CO3	Learn how to apply OOP concepts to solve programming problems, design software systems, and develop reusable code.
CO4	Understand how to create classes and objects in a programming language that supports OOP
CO5	Learn how to use inheritance to create hierarchies of classes and reuse code efficiently.

Course#24

Course: Computer Graphics	
Course Code: BCA-4-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2	Demonstrate proficiency in 2D graphics programming, including concepts like 2D transformations.
CO3	Analyze and implement key computer graphics algorithms, such as line drawing algorithms, polygon filling algorithms, and clipping algorithms.
CO4	Extract scene with different clipping methods and its transformation to graphics display device.
CO5	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.

Course#25

Course: Object Oriented Programming Lab	
Course Code: BCA-4-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop the ability to apply OOP fundamentals in creating well-structured and readable code.
CO2	Develop Programs for file handling.
CO3	Develop Programs for Operator Overloading.
CO4	Gain practical experience in implementing OOP concepts such as classes, objects, inheritance, and polymorphism in programming assignments.

CO4	Gain proficiency in using programming languages that support OOP to develop applications and solve real-world problems.

Course#26

Course: Computer Graphics Lab	
Course Code: BCA-4-04P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Implement the basic concepts of computer graphics.
CO2	Design & Implement scan conversion problems using Python Programming
CO3	Apply clipping and filling techniques for modifying an object.
CO4	Understand the concepts of different type of geometric transformation of objects in 2D and 3D.
CO5	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.

Course#27

Course: Introduction to Cyber Security	
Course Code: BCA-5-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand network security threats, security services, and countermeasures.
CO2	Understand principles of network security by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.
CO3	Develop cyber security strategies and policies
CO4	Measure the performance and troubleshoot cyber security systems.
CO5	Understand various Cryptographic Techniques

Course#28

Course Name: Introduction to Cyber Security Lab **Course Code: BCA-5-01P**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Identify and analyze common cyber threats, including malware, phishing attacks, and network vulnerabilities.
CO 2	Apply techniques to detect, mitigate, and respond to various types of cyber threats.
CO 3	Implement security configurations for operating systems, network devices, and applications.
CO 4	Apply ethical hacking techniques to identify and exploit vulnerabilities in controlled environments, emphasizing responsible and legal practices.
CO5	Implement cryptographic techniques for security purpose

Course#29

Course: Introduction to Artificial Intelligence	
Course Code: BCA-5-02T-EC-A1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic concepts, principles, and techniques of artificial intelligence.
CO2	Explore real-world applications of AI in various domains such as healthcare, finance, and robotics.
CO3	Develop the ability to identify and formulate problems that can be solved using AI techniques.
CO4	Apply AI solutions to address real-world challenges.
CO5	Describe the basic concepts, principles, and techniques for the development of expert systems

Course#30

Course Name: Cyber Laws **Course Code: BCA-5-02T-EC-A2**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand various types of cyber crimes
CO 2	Understand Indian Laws to deal with Cyber Crimes and its critical analysis
CO 3	Understand Legal Recognition of Electronic Records and Electronic Evidence
CO 4	Examine and interpret laws related to cybercrimes, including hacking, identity theft, and online fraud.
CO 5	Explore the legal aspects of intellectual property rights, including copyright, patents, and trademarks, in the digital environment.

Course#31

Course: Introduction Mobile Architecture	
Course Code: BCA-5-02T-EC-A3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain a foundational understanding of major mobile platforms (iOS, Android) and their architecture, including the key components and frameworks that enable mobile application development.
CO2	Learn the fundamental principles of designing mobile applications, considering factors such as user interface (UI), user experience (UX), and responsiveness across different devices.
CO3	Acquire knowledge of cross-platform development frameworks (e.g., React Native, Flutter) and understand how to create mobile applications that can run on multiple platforms with a single codebase.

CO4	Develop an awareness of mobile security concerns and best practices, including data encryption, secure authentication, and protection against common mobile app vulnerabilities.
CO5	Learn how mobile applications interact with backend services, including the use of APIs (Application Programming Interfaces) and understanding the role of backend architecture in supporting mobile functionality.

Course#32

Course: Machine Learning	
Course Code: BCA-5-03T-EC-B1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental concepts and principles of machine learning.
CO2	Apply and evaluate various supervised learning algorithms
CO3	Explore and apply unsupervised learning techniques
CO4	Apply machine learning techniques to solve real-world problems
CO5	Evaluate the strengths and limitations of different machine learning approaches

Course#33

Course: Machine Learning Lab	
Course Code: BCA-5-03P-EC-B1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Apply a perceptron to solve binary classification problems.
CO2	Apply ADALINE and MADALINE to solve binary classification problems.
CO3	Write code to implement the backpropagation algorithm from scratch.
CO4	Implement and experiment with different clustering algorithms.
CO5	Work with real-world datasets to apply machine learning algorithms or training neural networks.

Course#34

Course Name: Digital Forensics **Course Code: BCA-5-03T-EC-B2**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the principles and concepts of digital forensics.
CO 2	Understand various types of cyber crimes
CO 3	Analyze computer architectures, file systems, and operating systems relevant to digital forensics investigations.
CO 4	Understand the legal and ethical considerations associated with digital forensics, including the admissibility of digital evidence in court.
CO 5	Utilize popular forensic tools and software for digital investigations.

Course#35

Course Name: Digital Forensics Lab **Course Code: BCA-5-03P-EC-B2**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO I	Understand the working of computer forensics and different tools used for forensic investigation
CO II	Recover Deleted Files using Forensics Tools
CO III	Utilize popular forensic tools and software for digital investigations.
CO IV	Work collaboratively in a team to conduct digital forensics investigations.
CO V	Compile and organize digital forensics findings into comprehensive reports

Course#36

Course: Introduction to Android	
Course Code: BCA-5-03T-EC-B3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Gain proficiency in Android app development, understanding the Android Studio development environment, Java or Kotlin programming languages, and the fundamental concepts of building Android applications.
CO2	Develop skills in designing user interfaces (UI) for Android applications, adhering to Android's design principles and guidelines to create visually appealing and user-friendly experiences.
CO3	Understand the process of deploying Android applications on the Google Play Store, including the necessary steps for app submission, review, and updates.
CO4	Learn to integrate and utilize various Android APIs and features, such as location services, camera access, notifications, and other functionalities to enhance the capabilities of Android applications.
CO5	Gain a comprehensive understanding of the Android ecosystem, including the Android OS architecture, application lifecycle, and how apps interact with the underlying system and hardware.

Course#37

Course: Introduction to Android Lab	
Course Code: BCA-5-03P-EC-B3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Attain proficiency in Android app development by gaining hands-on experience in designing, coding, and debugging basic Android applications using the Android Studio IDE.

CO2	Develop expertise in designing visually appealing and user-friendly Android user interfaces (UI), applying Android's design principles, layouts, and widgets effectively.
CO3	Learn to integrate and utilize various device features such as camera, sensors, and location services in Android applications, demonstrating the ability to create feature-rich and interactive mobile apps.
CO4	Acquire strong debugging and troubleshooting skills in the Android development environment, including the use of debugging tools and techniques to identify and fix common issues in Android applications.
CO5	Understand the process of deploying Android applications on physical devices or emulators, and gain proficiency in testing and validating the functionality of Android apps on different devices and screen sizes.

Course#38

Course: Seminar	
Course Code: BCA-5-04	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Enhance soft skill through oral presentation.
CO2	Gain ability to present literature survey, problem formulation and solution.
CO3	Prepare the proper documentation of software project following the standard guidelines
CO4	Develop technical report writing
CO5	Gain ability of discussion and questions handling.

Course#39

Course: Data Mining & Visualization	
Course Code: BCA-6-01T-EC-C1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand Data Warehouse fundamentals and Data Mining tools.
CO2	Understand Data Mining Techniques
CO3	Apply clustering methods like K means, hierarchical clustering, agglomerative clustering, divisive clustering to solve problems and evaluate clusters
CO4	Gain knowledge related to application areas of data mining
CO5	Understand the components involved in data visualization design.

Course#40

Course: Data Mining & Visualization Lab	
Course Code: BCA-6-01P-EC-C1	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explore WEKA Data Mining/Machine Learning Toolkit.

CO2	Perform data pre-processing tasks and Demonstrate performing association rule mining on data sets.
CO3	Demonstrate the performance of Naïve-Bayes and K-Nearest Neighbor classifiers on data sets.
CO4	Evaluate the performance of Naïve-Bayes and k-Nearest Neighbor classifiers through ROC Curves
CO5	Explore visualization features of Weka to visualize the clusters.

Course#41

Course Name: Cyber Attacks and Counter Measures **Course Code: BCA-6-01T-EC-C2**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the importance of a network basics and brief introduction on security of network protocols
CO 2	Demonstrate a solid understanding of foundational cybersecurity concepts, principles, and best practices.
CO 3	Apply risk assessment methodologies to evaluate and prioritize potential vulnerabilities within a given system or network.
CO 4	Design and develop security plans and strategies to ensure the integrity of information in compliance with best practices, relevant policies, standards, and regulations.
CO 5	Evaluate the impact of cybersecurity decisions on privacy, compliance, and organizational reputation, and adhere to ethical standards in the field.

Course#42

Course Name: Cyber Attacks and Counter Measures Lab **Course Code: BCA-6-01P-EC-C2**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Develop skills in configuring security settings for operating systems, networks, and applications.
CO 2	Analyse network traffic using tools like Wireshark.
CO 3	Conduct vulnerability assessments to identify potential weaknesses and recommend appropriate countermeasures.
CO 4	Apply tools to analyze network traffic and system logs in real-time.
CO 5	Understand and apply secure coding practices to develop resilient software.

Course#43

Course: Introduction to Windows Mobile and IOS
Course Code: BCA-6-01T-EC-C3
Course Outcomes (COs) After the completion of this course, the students will be able to:

CO1	Gain proficiency in developing mobile applications for both Windows Mobile and iOS platforms, understanding the respective development environments, tools, and programming languages (e.g., C# for Windows Mobile, Swift for iOS).
CO2	Develop skills in designing user interfaces (UI) for both Windows Mobile and iOS applications, considering platform-specific design guidelines and best practices to create intuitive and user-friendly experiences.
CO3	Understand the process of deploying mobile applications on the Windows Mobile Store and Apple App Store, including the submission and review processes for each platform.
CO4	Explore techniques for achieving cross-platform compatibility, either through platform-specific development or by using cross-platform frameworks, allowing the creation of applications that can run on both Windows Mobile and iOS.
CO5	Learn about the lifecycle management of mobile applications on Windows Mobile and iOS, including topics such as app states, background processing, and handling interruptions to create responsive and efficient applications.

Course#44

Course: Introduction to Windows Mobile and IOS Lab	
Course Code: BCA-6-01P-EC-C3	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Attain proficiency in developing mobile applications for both Windows Mobile and iOS platforms, demonstrating the ability to use respective development environments, tools, and programming languages effectively.
CO2	Develop advanced skills in designing user interfaces (UI) for Windows Mobile and iOS applications, adhering to platform-specific design guidelines and creating visually appealing and intuitive user experiences.
CO3	Gain the ability to design and implement applications that run seamlessly on both Windows Mobile and iOS platforms, exploring approaches such as platform-specific development and cross-platform frameworks.
CO4	Learn to integrate and utilize various platform-specific features and functionalities, such as utilizing Windows Mobile and iOS APIs for device-specific capabilities like camera, location services, and notifications.
CO5	Understand the process of deploying mobile applications on the respective app stores (Microsoft Store and Apple App Store), including app submission, review processes, and compliance with store guidelines for both Windows Mobile and iOS.

Course#45

Course: Minor Project	
Course Code: BCA-6-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate a technical knowledge of their selected project topic.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.

CO3	Design solutions to problems utilizing a systems approach.
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Course#46

Course: Technical Report Writing & IPR	
Course Code: BCA-6-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the purpose and importance of technical report writing.
CO2	Identify different types of technical reports and their specific requirements.
CO3	Utilize various data visualization techniques to present technical information effectively.
CO4	Understand the Intellectual Property (IP) Concepts.
CO5	Understand the Procedure for grants of patents.

Course#47

Course: Summer Internship	
Course Code: BCA-6-04	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Acquire knowledge of various programming languages and tools.
CO2	Acquire knowledge of software engineering process life cycles and its implementation.
CO3	Learn testing of software systems.
CO4	Acquire knowledge of industry day to day operations and learn to document project work.
CO5	Able to demonstrate technical and communication skills.

Course#48

Course: Research Methodology & Statistical Analysis	
Course Code: BCA-7-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify and differentiate between various research methodologies, including qualitative, quantitative, and mixed methods.
CO2	Understand the principles underlying each research approach and their suitability for different types of research questions and objectives..
CO3	Develop skills in designing research studies, including formulating research questions, hypotheses, and objectives.

CO4	Demonstrate an understanding of ethical considerations in research design and implementation.
CO5	Gain proficiency in basic statistical concepts, including descriptive statistics, inferential statistics, and hypothesis testing.

Course#49

Course: Optimization Techniques	
Course Code: BCA-7-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Define and explain optimization problems in various domains.
CO2	Analyze the optimality criteria for various optimization techniques.
CO3	Translate practical problems into mathematical expressions for optimization.
CO4	Understand the concepts of Genetic programming.
CO5	Analyze optimization methods based on the behavior of biological and swarm of insects.

Course#50

Course: Digital Image Processing	
Course Code: BCA-7-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Define digital images and understand the principles of image representation, including pixel values, color spaces, and image formats.
CO2	Gain proficiency in basic image enhancement techniques, including contrast enhancement, brightness adjustment, and histogram equalization.
CO3	Understand advanced enhancement techniques, such as spatial domain filtering, frequency domain filtering, and adaptive enhancement methods.
CO4	Gain an understanding of image compression techniques to reduce storage space and transmission bandwidth requirements.
CO5	Develop skills in image segmentation techniques for partitioning images into meaningful regions or objects.

Course#51

Course Name: Digital Image Processing Lab **Course Code: BCA-7-03P**	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO 1	Understand the basic functionalities and user interfaces of these tools for performing various image processing tasks.
CO 2	Gain hands-on experience with techniques such as contrast stretching, histogram equalization, and spatial filtering for enhancing image quality

CO 3	Implement image segmentation algorithms to partition images into meaningful regions or objects.
CO 4	Implement image compression algorithms to reduce the size of digital images while preserving visual quality.
CO5	Gain hands-on experience to enhance image the quality of images using spatial filters

Course#52

Course: Entrepreneurship Development	
Course Code: BCA-7-04T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Develop an entrepreneurial mindset, fostering creativity, and innovation.
CO2	Acquire the skills to create comprehensive business plans, including market analysis, financial projections, and operational strategies.
CO3	Gain a solid understanding of financial principles relevant to entrepreneurship, including budgeting, financial forecasting, and resource allocation.
CO4	Develop the ability to assess and manage risks associated with entrepreneurial ventures.
CO5	Cultivate effective networking and communication skills crucial for entrepreneurship.

Course#53

Course: Organizational Behavior	
Course Code: BCA-8-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Identify and describe key individual differences and personality traits that influence behavior in the workplace.
CO2	Demonstrate an understanding of the impact of communication, conflict, and leadership on group behavior.
CO3	Analyze the components of organizational culture and assess its influence on employee behavior.
CO4	Evaluate different leadership theories and styles, and apply them to real-world leadership scenarios.
CO5	Propose strategies for creating a positive work environment that promotes employee well-being.

Course#54

Course: Web Designing & Development	
Course Code: BCA-8-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand characteristics of a website.

CO2	Understand web Programming Technologies: Programming Languages, Frameworks, Libraries, Databases
CO3	Learn about design principles such as layout, typography, color theory, and user experience (UX) design, and how these principles apply to web design.
CO4	Learn how to use graphics and multimedia elements, such as images, videos, and animations, to enhance the visual appeal and interactivity of websites.
CO5	Gain practical experience with web development tools and frameworks, such as Bootstrap, jQuery, and AngularJS, to streamline the development process and enhance website functionality.

Course#55

Course: Web Designing & Development Lab	
Course Code: BCA-8-02P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understanding of the structure and syntax of HTML, including elements, attributes, and how to create well-formed HTML documents.
CO2	Create basic web pages using HTML, including adding text, images, links, lists, tables, forms, and other elements.
CO3	Understand the fundamentals of JavaScript programming, including variables, data types, operators, and control structures, and be able to use JavaScript to create interactive and dynamic web content.
CO4	Develop client-side scripts using JavaScript to enhance the functionality and interactivity of web pages.
CO5	Understanding of the core concepts of AngularJS, including directives, controllers, services, filters, and modules.

Course#56

Course: Research Project	
Course Code: BCA-8-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate an advanced technical knowledge of their selected project topic.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.
CO3	Design solutions to problems utilizing a systems approach
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning.