



CIMAGE PROFESSIONAL COLLEGE

Affiliated by Aryabhata knowledge University, Patna

**PROGRAMME OUTCOMES (POs), PROGRAMME SPECIFIC
OUTCOMES (PSOs) & COURSE OUTCOMES (COs)**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)
(THREE YEAR PROGRAMME)**

VISION

The Vision of the Department is:

- To produce competent job ready Software Professionals pool with strong values who are technically Sound to accept the real world challenges.
- Visualizing the department as an academic distinction recognize for its total commitment.
- Superiority in technical education and research with holistic concern for quality in life, environment, society and ethics through expanding the horizon.

MISSION

The Mission of the Department is:

- To entail the empirical knowledge of a new generation of interdisciplinary aspirants who build bridges and innovate at the intersection of multiple scientific domains.
- To thrive for qualitative skills for better endurance in diverse and consistent growing technological environment.
- To provide an ecosystem conducive to exploring and learning computer applications.
- To inculcate strong national values and ethics in students.
- To promote a culture of innovative thinking and continuous learning in the department.

PROGRAMME OUTCOMES

- PO-01. Technical Proficiency:** To develop skilled and professionally motivated job ready technocrats, equipped with critical reasoning and ethical values that fosters scientific temperament with a sense of social responsibility. Demonstrate proficiency in fundamental and advanced computing techniques, languages, and tools to develop software applications.
- PO-02. Industry-Relevant Skills:** Acquire skills in current technologies, including web development, mobile app development, cloud computing, and data analytics, to meet industry demands.
- PO-03. Problem Solving and Critical Thinking:** Develop strong analytical and problem-solving skills to tackle complex computing challenges in a professional setting.
- PO-04. Professional Communication:** Exhibit effective communication skills for technical and non-technical audiences, essential for client interactions, teamwork, and presentations.
- PO-05. Project Management:** Gain knowledge and experience in managing software projects, including planning, execution, and delivery within constraints such as time and budget.
- PO-06. Team Collaboration:** Work effectively in teams, demonstrating leadership and collaboration skills essential for a professional environment.
- PO-07. Adaptability and Lifelong Learning:** Show a commitment to continuous learning and adaptability to keep up with rapid technological advancements and changing job requirements.
- PO-08. Ethical and Social Responsibility:** Understand and adhere to ethical principles and social responsibilities, ensuring professional integrity and respect for diverse cultural contexts.
- PO-09. Entrepreneurial Skills:** Foster entrepreneurial thinking and skills necessary for innovation and startup ventures in the tech industry.
- PO-10. Employability Skills:** Develop a strong professional profile through internships, industry projects, certifications, and participation in technical events and competitions.
- PO-11.** Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
- PO-12.** To impart expertise required for planning, designing and building complex software systems as well as provide support to automated systems.

PROGRAMME SPECIFIC OUTCOMES (PSO):

- 1) Students will able to understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.
- 2) Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.
- 3) Student will able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.

SEMESTER WISE SUBJECT LIST :

B. C. A. Semester I

BCA -101	Communicative English
BCA -102	Basic Mathematics -I
BCA -103	Information Technology and Application
BCA-104	Principles of Management& Organization
BCA-105	Python Programming (Elective 1)
BCA-106 P	Computer Application Lab
BCA 107 P	Professional Communication Lab
BCA GP	General Proficiency

B. C. A. Semester II

BCA -201	Business English
BCA -202	Mathematics [Numerical Techniques]
BCA -203	System Analysis and Design
BCA -204	Problem Solving Technique & Programming in C
BCA- 205	Operating System & Unix
BCA -206 P	Advanced Professional Communication Lab
BCA -207 P	Data Structure lab

B. C. A. Semester III

BCA -301	Object Oriented Programming Using C++
BCA -302	Internet & Web Programming
BCA -303	Java Programming
BCA -304	Software Engineering
BCA- 305 P	(301 & 303)
BCA -306 P	(302 & 304)

B. C. A. Semester IV

BCA -401	Relational Database Management System
BCA -402	Digital Electronics, Computer System Architecture & Organisation
BCA -403	File & Data Structure
BCA -404	Introduction to Statistics
BCA -405 P	(401)
BCA -406 P	(403)
BCA GP	General Proficiency

B. C. A. Semester V

BCA -501	Windows Programming Using VB .NET
BCA -502	Graphics and Multimedia
BCA -503	Computer Network, Data Communication, and Client Server Technology
BCA -504	Business Accounting & ERP
BCA -505 P	(501)
BCA -506 P	(502)
BCA -GP	General Proficiency

B. C. A. Semester VI

BCA -601	Web Technology (Elective-1)
BCA -602	Concepts of Data Mining and Data Warehousing (Elective-2)
BCA -603	E-Commerce
BCA -605 P	Advanced Technology (Dot Net) Lab
BCA-Pro	Project
BCA- GP	General Proficiency

COURSE OUTCOME (CO) :

BCA-101: COMMUNICATIVE ENGLISH COURSE OUTCOMES:

- C01:** These topics will enable the students to know about the formal way of exchanging information by which professional relationships are maintained between organizations, employees and clients.
- C02:** These topics will provide the ideas to the students about the govt. correspondence. They will come to know about official and formal documentation.
- C03:** These topics will help the students writing professionally so that data can be presented logically .
- C04:** These will help the students building the strong foundation of grammar.
- C05:** These stories are taught to the students to motivate them to do something bigger in their life.

BCA-102: BASIC MATHEMATICS COURSE OUTCOMES:

- C01:** Familiarize students with abstract mathematical thinking, apply mathematical concepts like set, function and relation. Build mathematical foundation for programming languages.
- C02:** Understand the idea of derivative, to relate the geometric ideas to the analytic ideas, e.g. slope of a tangent, and carry out computations using derivatives.
- C03:** know the meaning of integration and learn some easy formula. Various techniques for integration. Interpret definite integrals and compute properties of various geometrical shape using integration.
- C04:** To analysis properties of two-dimensional geometric shapes. To develop mathematical arguments about geometric relationships. To handle its applications in real world.

BCA-103: INFORMATION TECHNOLOGY AND APPLICATION COURSE OUTCOME:

- C01:** Students shall be able to understand evolution of computer, its components and uses clearly and concisely.
- C02:** Students shall be able to understand different peripherals used with computer in detail and clearly.
- C03:** Students shall be able to understand use of software at computer hardware and able to understand concept of programing. It will help them to understand different programing languages and software development.
- C04:** Students shall be able to understand Operating system and its types, importance and its uses.
- C05:** Students shall be able to understand computer networking concept, logical addressing and concept of Internet. They shall be able to understand transmission of data over network.
- C06:** Students shall be able to understand use of Microsoft Office package. It will help them to make their office work easier.

BCA-104: PRINCIPLES OF MANAGEMENT AND ORGANIZATION COURSE OUTCOMES:

- CO1:** The students will be able to define management and the roles of managers in the organization.
- CO2:** Students will be able to describe the work of major contributors to the field of management.
- CO3:** Students will be able to explain how managers align the planning process with company mission, vision and values.
- CO4:** Students will be able to explain the process and techniques of individual and group decision making.
- CO5:** Students will be able to develop skills to analyze and design organizational systems and processes.

BCA-105: PYTHON PROGRAMMING (ELECTIVE 1) COURSE OUTCOMES:

- CO1:** Students shall be able to understand about Python Programming, Features and Intelligence over new technologies like Artificial Intelligence, Data Science, etc. Students shall also be able to write Python programs using concept of Lists, Tuples, Dictionaries, Sets, Strings, Importing Modules, with the concept of Error Handling by following different Python IDEs like Python IDLE, PyCharm, VSCode.
- CO2:** Students shall be able to understand about the concept of Control Structures like if...else, while loop, for loop, Loop Control by following the concept of Numbers, Strings, Lists, Tuples, Dictionaries. Students shall also be able to use Date & Time functions, Creating Modules, Files Read/Write, Importance of Classes and Objects, Regular Expressions, and GUI Programming.

BCA-201: BUSINESS ENGLISH COURSE OUTCOME COURSE OUTCOME:

- CO1:** These topics were taught to enhance the word power. They will learn to use the appropriate words.
- CO2:** These topics help the students to have better comprehending and analytical ability.
- CO3:** This unit is designed to get the students familiar with business correspondence, how to register and handle complains. It helps the students to draft notice. Students will be able to write well-presented business documents. They will learn to write business documents in a proper format.
- CO4:** This unit boosts up the confidence of speaking instantly. It also enhances the analytical ability of the students. Students can convey the ideas clearly and concisely. They will be able to speak intelligibly using word stress.

BCA-202: MATHEMATICS [NUMERICAL TECHNIQUES] COURSE OUTCOMES:

- CO1:** Ability for solving an algebraic or transcendental equation using an appropriate numerical method.
- CO2:** Ability to approximate a function using an appropriate numerical method.
- CO3:** Enable to know how to find out the polynomial from the given tabulated value.
- CO4:** Enable to solve a linear system of equations using an appropriate numerical method, calculate a definite integral using an appropriate numerical method.

BCA-203 SYSTEM ANALYSIS & DESIGN COURSE OUTCOMES

- CO1:** Student shall be able to understand fundamentals, classification, various approaches for development of systems and its prototype along with its analysis.
- CO2:** Student shall be able to understand system analyst's role, duties, various functional areas and skills required to be a system analyst
- CO3:** Student shall be able to understand SDLC, its different phases and case study.
- CO4:** Student shall be able to understand concept, types, process and different standard for documentation
- CO5:** Student shall be able to understand the detailed process of system planning which includes its feasibility at various parameters, cost benefit analysis and joint application development
- CO6:** Student shall be able to understand the design principle, structured charts, goals of design along with concept of coupling and cohesion.
- CO7:** Student shall be able to understand logical and physical design, process modelling, data dictionary, data flow diagram, decision tables and trees.
- CO8:** Student shall be able to understand design forms, reports, issues, design specification, sample design, testing, relevance, accuracy, cost and timeliness.

BCA-204: PROBLEM SOLVING TECHNIQUE & PROGRAMING IN C COURSE OUTCOMES (COs):

- CO1.** Ability to apply the concept of algorithm and flowcharts in programming.
- CO2.** Enable to understand about writing, compiling and executing a program in C language. Learn the fundamental building blocks of C Language like constants, variables, identifiers, operators, type conversion and nested control structure.
- CO3.** Ability to write programs in C-language that involves decisions and iterations.
- CO4.** Learn the concepts of defining and processing various kind of single and multi-dimension arrays and strings.
- CO5.** Able to create and implement user defined data types like Structure and unions, bitwise operations in a program.
- CO6.** Ability to the implementation of functions, pointers and arrays, operation on pointer, creating, processing, opening and closing a data file using C programming language.

- CO7.** Enable to use C preprocessor directive like #define, #include, #ifdef for various operation in a program.
- CO8.** Enable to implement the concepts of File handling in C using file pointers, apply various operation on file for creating, storing, retrieving and manipulating data in a disk file using C program.

BCA-205: OPERATING SYSTEM COURSE OUTCOMES (COs):

- CO1.** Student shall be able to analyze various process scheduling Algorithms and their comparisons.
- CO2.** Student shall be able to understand the process of synchronization problems.
- CO3.** Student shall be able to implement the concept of deadlock detection and avoidance.
- CO4.** Student shall be able to compare and contrast various Memory management schemes and Page replacement policies.
- CO5.** Student shall be able to understand the concept of File and Disk management.
- CO6.** Student shall be able to describe the UNIX operating system commands.
- CO7.** Student shall be able to understand the UNIX Architecture, File systems and use of basic Commands.
- CO8.** Student shall be able to understand and analyze UNIX System calls, Process Creation, Control & Relationship.
- CO9.** Student shall be able to understand Shell Programming and to write shell scripts.

BCA-301: OBJECT ORIENTED PROGRAMMING USING C++ COURSE OUTCOMES (COs):

- CO1.** Student shall be able to understand the basic concepts of object-oriented modeling and designing.
- CO2.** Student shall be able to write, compile, run, and test simple object-oriented C++ programs.
- CO3.** Student shall be able to understand the basic concept of C++.
- CO4.** Student shall be able to understand the concept of Polymorphism-Compile Time & Run time with the help of building concept about function overloading, Operator overloading as well as Virtual function.
- CO5.** Student shall be able to understand the use of inheritance, various mode of inheritance as well as different types of inheritance used for fulfill the requirement of reusability of code as per demand of the user feedback.
- CO6.** Student shall be able to understand the implementation of templates- class & Function, Exception handling in the program.
- CO7.** Student shall be able to understand the concept of File Handling.

BCA-302 INTERNET & WEB DESIGNING COURSE OUTCOMES (COs)

- CO1:** Enable to understand the basic concept of Internet and how it works. They will also be able to understand the different types of Internet connection. They will understand the IP address, domain name and server and how Transmission Control Protocol and Internet Protocol help to communicate in Internet.
- CO2:** Enable to the use of HTML and how they can create the basic web pages. They will be able to add text, image, audio, video in web page. They will also link multiple pages.
- CO3:** Ability to uses of JavaScript in web page and how to create interactive web pages. They will learn XML, JSP for creating dynamic web pages.

BCA – 303 JAVA PROGRAMMING COURSE OUTCOMES (CO)

- CO1:** Enable to understand Evolution of Java, features of Java, differences between C/C++ and Java, Java and Internet. Students shall also be able to write and run Java Programs using different IDEs such as Notepad++, Eclipse, NetBeans, VSCode by following the concept of Constants, Variables, Data Types.
- CO2:** Enable to write Java Programs using Operators, Expressions and Mathematical functions such as finding Average of Numbers, Compound Interest, Area of Triangle using Heron's formula, Quadratic Equation, Type Conversion, etc.
- CO3:** Ability to write Java Programs by following the Concept of Decision Making using if Statement, Nested if, Ladder if, switch and Turnery operator such as Bigger among three numbers, Marks Grading System, Checking Leap Year, etc.
- CO4:** Enable to write Java Programs by following the Concept of Looping such as Prime numbers, Perfect number, Finding Factorial, Fibonacci Series, etc
- CO5:** Enable to develop Java Programs using Classes, Objects and Methods. Students shall also be able to develop Java Programs using features of OOPS Concept such as Constructors, Methods Overloading, Static Members, Inheritance, Methods Overriding, Abstract Method and Classes.
- CO6:** Ability to use Arrays, String and Vectors concepts in their Java programs. Students shall also be able to create and use Packages, Multithreading Programming with priority and synchronization.
- CO7:** Ability to use Exception handling, Applet Concept in their Java Programming.
- CO8:** Ability able to write data on file, read data from file using File Stream Classes.

BCA – 304 SOFTWARE ENGINEERING COURSE OUTCOMES(CO)

- CO1:** Enable to understand about Software Engineering their Characteristics, Emergence, Various Metrics & Models, Process & SDLC.
- CO2:** Enable to understand study about Software Project Management software Size, Cost Estimation through various method and also know about SRS Documents, their Characteristics and Organization.
- CO3:** Enable to understand classification and approach of software design along with its structured analysis.
- CO4:** Enable to understand different types of testing of software and Reliability Metric- Musa's Basic Model.
- CO5:** Student Shall be able to understand different quality assurance technique and their comparison along with maintenance process and estimation cost.

BCA - 401 RELATIONAL DATABASE MANAGEMENT SYSTEM COURSE OUTCOMES (COs):

- CO1.** Ability to understand database concepts, structures and query language.
- CO2.** Ability to understand the E R model and relational model.
- CO3.** Ability to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
- CO4.** Ability to create and manage database with all integrity constraints.
- CO5.** Student shall be able to refine the schema of database by applying normal forms.
- CO6.** Student shall be able to understand concept of transaction processing and concurrency control.

BCA-402: DIGITAL ELECTRONICS, COMPUTER SYSTEM ARCHITECTURE & ORGANIZATION COURSE OUTCOMES (COs):

- CO1.** Student shall be able to understand about Von Neumann & Harvard Architecture, various generation of microprocessor.
- CO2.** Student shall be able to Gain knowledge of different types of number systems, and their conversions, concept about various codes to perform information interchange between user and computer.
- CO3.** Student shall be able to design various logic gates and simplify Boolean functions using simplification tool (Karnaugh map).
- CO4.** Student shall be able to design various flip flops, shift registers and determining outputs.
- CO5.** Student shall be able to analyze, design and implement combinational logic circuits.
- CO6.** Student shall be able to perform computer arithmetic operations.
- CO7.** Student shall be able to understand the concept of memory organization and hierarchy of memory within the computer.

- CO8.** Student shall be able to understand concept of CPU organization, Instruction Format used for writing instructions for different types of computer (Stack Organized Computer, Accumulator organized computer & General purpose Register based computer), various addressing scheme used for selection of data or value from the location during operational execution.
- CO9.** Student shall be able to understand the mechanism related to Input/output organization.
- CO10.** Student shall be able to understand Control unit, memory design and ALU functionality of computer system.

BCA – 403 FILE & DATA STRUCTURE COURSE OUTCOMES(COs)

- CO1:** Ability to know about Algorithm and their development and analysis, importance of Data Structure with File system, Abstract Data Type(ADT), Linear and Non Linear Data Structure
- CO2:** Enable to differentiate about Static memory and Dynamic Memory, Static List such as Arrays and Dynamic List such as Linked Lists, Creating different types of Linked Lists such as Singly, Double and Circular.
- CO3:** Enable to use the concept of Stack such as Push, Pop and Peep in their applications. Students shall also be able to use the concept of Queue and their types such as Circular Queue, Dequeue and Priority Queue in their applications.
- CO4:** Enable to use different types of Trees such as Binary Tree, Binary Search Tree, Threaded Binary Tree, AVL Tree, B Tree.
- CO5:** Enable to design Road Traffic System, Railway Traffic System, Air Traffic System, Networking Routers Traffic System, etc. using Graph. Students shall also be able to find shorted path from source to target in any type of Traffic Mapping System.
- CO6:** Enable to know where required Internal and External Sorting will.
- CO7:** Enable to arrange List values either in Ascending or Descending using Sorting techniques such as Selection sort, Bubble sort, Insertion sort, Quick sort, 2-way merge sort, Heap sort.
- CO8:** Enable to search a value among List of values by using Searching concepts such as Linear or Sequential Searching, Binary Searching, and Interpolation Search.

BCA-404 INTRODUCTION TO STATISTICS COURSE OUTCOMES:

- CO1:** Students shall be able to frequently use it in computer science to derive the formulas and it is used for the estimation of the analysis of the algorithms.
- CO2:** It will help students to describe situations, to draw conclusions, to make inferences about events, to organize the data in some meaningful way and to facilitate computational procedures for measures of average and spread.
- CO3:** Students will encounter aspects of probability every day. Additionally, it is another essential concept to be an effective citizen, as it builds our understanding of chance and variation in life.

- CO4:** Correlation facilitates the decision-making in the business world. It reduces the range of uncertainty as predictions based on correlation are likely to be more reliable and near to reality.
- CO5:** Students shall be able to study a small group of people from the large group to derive inferences that are likely to be applicable to all the people of the large group.

BCA-501 Windows Programming using VB .Net COURSE OUTCOMES (CO)

- CO1:** Enable to understand about Dot net framework structure, functioning etc.
- CO2:** Enable to understand the basic syntax of VB.net. They will be able to write various programs based on conditions. Students will be able to understand the concept of array and implement programs based on array.
- CO3:** Ability to learn the concept of Object Oriented Programming and implement these features using programs.
- CO4:** Ability to learn about Windows GUI forms. They will design the various form and validate them. They will be able to understand the Single Document Interface and Multiple Document Interface.
- CO5:** Enable able to understand ADO Components. They will able to create database connection and perform Create, Read, Update, delete operation using GUI Forms.

BCA-502 GRAPHICS AND MULTIMEDIA COURSE OUTCOMES (COs):

- CO1.** Student shall be able to understand about working of display systems with picture analysis.
- CO2.** Student shall be able to gain knowledge to execute various Scan Conversion algorithms in laboratory so as to draw Graphics primitives.
- CO3.** Student shall be able to familiarize with 2D and 3D graphic concepts with the help of various mode of transformation.
- CO4.** Student shall be able to create 2D objects using Geometrical Transformations.
- CO5.** Student shall be able to understand the concept of hidden lines & surfaces, Color models, parametric and non-parametric representation as well as various illumination models.
- CO6.** Student shall be able to describe the types of media and define multimedia system as well as architecture of Multimedia.
- CO7.** Student shall be able to describe the stages of a project in multimedia and its hardware and software requirements.
- CO8.** Student shall be able to understand concept of Animation and various animation technique used to deploy animation.

BCA-503 COMPUTER NETWORK, DATA COMMUNICATION, AND CLIENT SERVER TECHNOLOGY COURSE OUTCOMES(CO)

- CO1.** Student will be able to understand network communication using the layered concept - Open System Interconnection (OSI) and Internet Model.
- CO2.** Student will be able to understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device.
- CO3.** Student will be able to understand the concept of flow control, error control and LAN protocols; to explain the design and algorithms used in at the physical and data link layers.
- CO4.** Student will understand the working principles of LAN and the concepts behind physical (MAC) and logical addressing (IP), subnetting and supernetting.
- CO5.** Student shall understand the functions performed by a Network Management System and to analyze connection establishment and congestion control with respect to TCP Protocol.
- CO6.** Student shall understand the principles and operations behind various application layer protocols like HTTP, SMTP, FTP.
- CO7.** Student shall be able to understand the concept server & client architecture and its different deployment models.
- CO8.** Students shall be able to understand the concept of Distributed System, its design principles and the architectures.

BCA-504: BUSINESS ACCOUNTING & ERP COURSE OUTCOMES(CO)

- CO1.** Students will be able to understand the concept of Accounting , Process of accounting and preparation of Cash Book .
- CO2.** Students will be able to understand the meaning, needs and importance of BRS.
- CO3.** Students will be able to understand the meaning of Bills of exchange, its features and also Party to a Bills of Exchange.
- CO4.** Students will be able to prepare the final account i.e Income Statement and Position Statement through various adjustments Entry.
- CO4.** Students will be able to know how to rectify the error regarding financial transactions.
- CO5.** Students will be able to how to prepare consignment Account & Joint Venture Account from the various transaction related to consignor and consignee as well as co-venture .& How to calculate Profit or Loss under single entry system & also how to prepare self-balancing ledger.
- CO6.** Students will be able to prepare the Receipt and Payment A/C, Income & Expenditure A/C, & Balance Sheet through the various Cash & Credit Transaction.
- CO7.** Students will be able to how to calculate the amount of depreciation on different depreciable assets under different methods like WDV Method and SLM etc and to prepare the assets account and also know about provisions and reserves.

BCA-601: WEB TECHNOLOGY (ELECTIVE-1) COURSE OUTCOMES

- CO1.** Ability to analyze a web page and identify its elements and attributes. Create web pages using XHTML and CSS. Build dynamic web pages using JavaScript (Client side programming). Create XML documents and Schemas. Build interactive web applications using AJAX.
- CO2.** Ability to gain knowledge of client-side scripting, validation of forms, and AJAX programming. To introduce Server side programming java with servlets and JSP. Understand what XML is and how to parse and use XML data with java.
- CO3.** Ability to developed web based application using suitable client side and server side web technologies. Develop solutions to complex problems using appropriate method, technologies, frameworks, web services and content management.

BCA – 602E-COMMERCE COURSE OUTCOMES (COs):

- CO1.** Ability to understand the foundations and importance of E-commerce.
- CO2.** Ability to understand the concept of various model of commerce.
- CO3.** Ability to build e-commerce web sites on the basis of business models.
- CO4.** Enable to analyze the importance of encryption on E-commerce.
- CO5.** Enable to determine the effectiveness of electronic payments as an emerging financial instrument.