

BCA PROGRAM OUTCOME (POs)

- **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
- **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
- **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
- **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
- **Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
- **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
- **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
- **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
- **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrity in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
- **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
- **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

BCA PROGRAM SPECIFIC OUTCOME (PSOs)

- Apply standard Software Engineering practices and strategies in real -time software project development.
- Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.
- Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems.
- The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
- The ability to work independently on a substantial software project and as an effective team member.

BCA COURSE OUTCOME

FIRST SEMESTER

First semester consists of the following subjects:

SUBJECT	SUBJECT CODE	COURSE OUTCOME
Fundamentals of Computers	DSC1	<ul style="list-style-type: none">• Understand the fundamentals of computer system.• Identify different components within the computer system.• Understand different types of input and output devices.• Demonstrate the working concepts of different devices connected to computer.• Explain different generations of programming languages and their significance.• Understand the use of Word processing, Spreadsheet, Presentation and DBMS applications.• Understand Digital computer and digital systems functioning.
Programming in C	DSC2	<ul style="list-style-type: none">• Confidently operate Desktop Computers to carry out computational tasks.• Understand working of Hardware and Software and the importance of operating systems.• Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts.• Read, understand and trace the execution of programs written in C language.• Write the C code for a given problem.• Perform input and output operations using programs in C.• Write programs that perform operations on arrays.

Mathematical Foundation	DSC3	<ul style="list-style-type: none"> • Study and solve problems related to connectives, predicates and quantifiers under different situations. • Develop basic knowledge of matrices and to solve equations using Cramer's rule. • Know the concept of Eigen values. • To develop the knowledge about derivatives and know various applications of differentiation. • Understand the basic concepts of Mathematical reasoning, set and functions.
Information Technology Lab	CACO1P	<ul style="list-style-type: none"> • Identification of the peripherals of a computer, components in a CPU and their functions. • Assembling and disassembling the system hardware components of personal computer. • Basic Computer Hardware Trouble shooting. • LAN and Wi-Fi Basics. • Operating System Installation Windows OS, UNIX/LINUX, Dual Booting. • Activities using word processing, presentation and spreadsheet software • Tasks involving Internet Browsing
C Programming Lab	CACO2P	<ul style="list-style-type: none"> • Develop a C program. • Control the sequence of the program and give logical outputs. • Implement strings in your C programming. • Store different data types in the same memory. • Manage input output operations in your C programming.
Office Automation	CACOE1/DSCOE1	<ul style="list-style-type: none"> • Compare and contrast various types of operating systems. • Explain the purpose of office automation. • Describe how information is stored and retried in/from computer memory. • Know about various types of office automation software and their applications. • Create document using word processing software.

		<ul style="list-style-type: none"> • Design presentation using presentation software. • Create worksheets using spreadsheet software. • Store and retrieve data in/from database management application.
Digital Fluency (SEC) (Common for all UG programs)	COMDFSN101	<ul style="list-style-type: none"> • Have an intelligent conversation on the key concepts and applications of Artificial Intelligence (AI), Big Data Analytics (BDA), Internet of Things (IoT), Cloud Computing, and Cybersecurity • Develop holistically by learning essential skills such as effective communication, problem-solving, design thinking, and teamwork. • Build his/her personal brand as an agile and expansive learner – one who is interested in horizontal and vertical growth.
Yoga and fitness	COMYGSN101	<ul style="list-style-type: none"> • Understand the principles of practicing asanas and fitness activities. • Learn the various concepts of fitness and general and specific conditioning for the same. • Practically learn the principles of implementing fitness activities and yoga. • Perform specific activities to develop motor abilities. • Perform fitness activities to improve fitness. • Perform prescribed asanas. • Learn and practice recreational activities to develop fitness.
Health and wellness	COMHWSN101	<ul style="list-style-type: none"> • Understand the concepts and significance of health and wellness. • Understand the role of physical activities in developing health and wellness. • Perform various physical and fitness activities to develop health and wellness. • Perform related tests to assess parameters related to health.

SECOND SEMESTER

Second semester consists of the following subjects:

SUBJECT	SUBJECT CODE	COURSE OUTCOME
Data Structures using C	DSC4	<ul style="list-style-type: none">• Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.• Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs• Write programs that use arrays, linked structures, stacks, queues, trees, and graphs• Demonstrate different methods for traversing trees• Compare alternative implementations of data structures with respect to performance• Describe the concept of recursion, give examples of its use• Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
Object Oriented Programming with JAVA	DSC5	<ul style="list-style-type: none">• Understand the features of Java and the architecture of JVM• Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done• Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance• The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language• Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files.

Discrete Mathematical Structures	DSC6	<ul style="list-style-type: none"> • To understand the basic concepts of Mathematical reasoning, set and functions. • To understand various counting techniques. • Understand the concepts of various types of relations, partial ordering and equivalence relations. • To understand the concept of probability and mathematical induction. • Familiarize the fundamental concepts of graph theory and shortest path algorithm. • To understand the concept of binary tree representation.
Data Structures Lab	CACO4P	<ul style="list-style-type: none"> • Ability to analyze algorithms and algorithm correctness. • Ability to summarize searching and sorting techniques • Ability to describe stack, queue and linked list operation. • Ability to have knowledge of tree and graphs concepts.
JAVA Lab	CACO5P	<ul style="list-style-type: none"> • Able to write programs for solving real world problems using java collection frame work. • Able to write programs using abstract classes. • Able to write multithreaded programs. • Able to write GUI programs using swing controls in Java.
Web Designing	CACOE2/DSCOE2	<ul style="list-style-type: none"> • Understand various Internet related terminologies • Explain features and evolution of Internet • Explain the use of search engines • Know the use of different tags available in HTML • Design web pages using HTML5, CSS3, XML and XHTML • Implement websites using linked web pages.

Environmental studies	COMEVS201	<ul style="list-style-type: none"> • To make students realize the importance and their role in the protection and maintenance of a healthy environment for sustainable development. • To enable students to grasp the significance and issues related to ecosystems, biodiversity and natural resources, and ways of managing/ Protecting them. • To enable students to have a nuanced understanding of environmental pollution, solid waste management and climate change and to act with concern on environmental issues. • To make students aware of the environmental policies and movements, and the role of individuals and communities in environmental protection for educating and inspiring the young minds.
Sports	COMSR201	<ul style="list-style-type: none"> • Learn the rules and regulations and practically participate in sports activities. • Be able to practice the skills of a game and athletic events. • Learn the various fitness activities and practically learn them. • Be able to teach and organize intramural and extramural competitions.
NSS	COMNSS201	<ul style="list-style-type: none"> • Involvement in the tasks of national development. • Better understanding and appreciation of the problems of the society. • Raising society to a higher material and moral level by preparing students for final dedication in the service of nation. • To uphold the value system based on the cultural, social, political and moral bases of Indian society.

THIRD SEMESTER

SUBJECT	SUBJECT CODE	COURSE OUTCOME
Database Management Systems	DSC7	<ul style="list-style-type: none">• Understand the various database concepts and the need for database systems.• Identify and define database objects, enforce integrity constraints on a database using DBMS.• Demonstrate a Data model and Schemas in RDBMS.• Identify entities and relationships and design ER diagrams for given real-world problems.• Represent ER model to relational model and its implementation through SQL.• Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.• Understand the transaction processing and concurrency control techniques.
C# and Dot Net Framework	DSC8	<ul style="list-style-type: none">• Understand Object Oriented Programming concepts like Inheritance and Polymorphism in C# programming language.• Interpret and Develop Interfaces for real-time applications.• Build custom collections and generics in C#.
Computer Communication and Networks	DSC9	<ul style="list-style-type: none">• Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.• Apply the basics of data communication and various types of computer networks in real world applications.• Compare the different layers of protocols.• Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.
Open-Source Tools	SEC-1	<ul style="list-style-type: none">• Recognize the benefits and features of Open-Source Technology and to interpret, contrast and compare open-source products among themselves.• Use appropriate open-source tools based on the nature of the problem.• Write code and compile different open-source software.

FOURTH SEMESTER

SUBJECT	SUBJECT CODE	COURSE OUTCOME
Python Programming	DSC10	<ul style="list-style-type: none">• Explain the basic concepts of Python Programming.• Demonstrate proficiency in the handling of loops and creation of functions.• Identify the methods to create and manipulate lists, tuples and dictionaries.• Discover the commonly used operations involving file handling.• Interpret the concepts of Object-Oriented Programming as used in Python.• Develop the emerging applications of relevant fields using Python.
Computer Multimedia & Animation	DSC11	<ul style="list-style-type: none">• Write a well-designed, interactive Web site with respect to current standards and practices.• Demonstrate in-depth knowledge of an industry-standard multimedia development tool and its associated scripting language.• Determine the appropriate use of interactive versus standalone Web applications.
Operating System Concepts	DSC12	<ul style="list-style-type: none">• Understand the fundamentals of the operating system.• Comprehend multithreaded programming, process management, process synchronization, memory management and storage management.• Compare the performance of Scheduling Algorithms• Identify the features of I/O and File handling methods.

FIFTH SEMESTER

SUBJECT	SUBJECT CODE	COURSE OUTCOME
Design And Analysis of Algorithms	DSC13	<ul style="list-style-type: none">• Understand the fundamental concepts of algorithms and their complexity, including time and space complexity, worst-case and average-case analysis, and Big-O notation.• Design algorithms for solving various types of problems, such as Sorting, Searching, and Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques.• Analyze and compare the time and space complexity of algorithms with other algorithmic techniques.• Evaluate the performance of Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques using empirical testing and benchmarking, and identify their limitations and potential improvements.• Apply various algorithm designs to real-world problems and evaluate their effectiveness and efficiency in solving them.
Statistical Computing & R Programming	DSC14	<ul style="list-style-type: none">• Explore fundamentals of statistical analysis in R environment.• Describe key terminologies, concepts and techniques employed in Statistical Analysis.• Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.• Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.• Understand, Analyze, and Interpret Correlation Probability and Regression to analyze the underlying relationships between different variables.

Software Engineering	DSC15	<ul style="list-style-type: none"> • How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment. • An ability to work in one or more significant application domains. • Work as an individual and as part of a multidisciplinary team to develop and deliver quality software. • Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
Artificial Intelligence	DSC16	<ul style="list-style-type: none"> • Gain a historical perspective of AI and its foundations. • Become familiar with basic principles and strategies of AI towards problem solving. • Understand and apply approaches of inference, perception, knowledge representation and learning. • Understand the various applications of AI.
Cloud Computing	DSE-E1	<ul style="list-style-type: none"> • Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing. • Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost. • Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing. • Analyze various cloud programming models and apply them to solve problems on the cloud.
Digital Marketing	VOC-1	<ul style="list-style-type: none"> • Understand the fundamental concepts and principles of digital marketing. • Develop practical skills to implement various digital marketing strategies and techniques • Analyze and evaluate the effectiveness of digital marketing campaigns. • Apply critical thinking and problem-solving skills to real-world digital marketing scenarios. • Create comprehensive digital marketing plans and strategies.

SIXTH SEMESTER

SUBJECT	SUBJECT CODE	COURSE OUTCOME
PHP & MySQL	DSC17	<ul style="list-style-type: none">• Design dynamic and interactive web pages and websites.• Run PHP scripts on the server and retrieve results.• Handle databases like MySQL using PHP in websites.
Mobile Application Development	DSE-E2	<ul style="list-style-type: none">• Create Servlets for server-side programming• Create, test and debug Android application by setting up Android development environment• Critique mobile applications on their design pros and cons,• Program mobile applications for the Android operating system and understand techniques for designing and developing sophisticated mobile interfaces• Deploy applications to the Android marketplace for distribution.
Web Content Management System	VOC-2	<ul style="list-style-type: none">• Understand content development basics• Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting• Host websites and develop content for social media platforms such as wiki and blog.• Understand e-publications and virtual reality• Use of e-learning platform Moodle and CMS applications Drupal and Joomla