

Department of Computer Science

Program Outcomes (PO)

Upon successful completion of the three years of Four-Year Undergraduate Programme (FYUGP) in Computer Science under Gauhati University, graduates will be able to:

- **PO1: Disciplinary Knowledge:** Demonstrate comprehensive and deep theoretical and practical knowledge across core computing domains, including programming paradigms, computer organization, data structures, algorithms, operating systems, database management, and computer networks.
- **PO2: Problem Solving and Analytical Skills:** Apply logical reasoning, mathematical foundations, and algorithmic principles to analyze complex computational problems and design optimal, efficient software solutions.
- **PO3: Software Design and Development:** Utilize modern programming languages (such as C, C++, Java, and Python), frameworks, and development environments to build scalable applications, web systems, and software solutions adhering to industry standards.
- **PO4: Modern Tool Usage and Professional Skills:** Select, configure, and integrate appropriate hardware platforms, database systems, networking tools, and software engineering methodologies to execute technical tasks efficiently.
- **PO5: Ethics, Communication, and Teamwork:** Uphold professional ethics, data privacy regulations, and social responsibilities while working effectively as an individual or part of a multidisciplinary team through clear technical documentation and communication.
- **PO6: Lifelong Learning:** Adapt to rapidly evolving technological landscapes by continuously acquiring new skills in emerging areas such as artificial intelligence, cloud computing, data mining, and cybersecurity.

Course-Wise Course Outcomes (COs) of Core Courses (Major)

Below are the Course Outcomes (COs) for all the Core Courses (Major) semester-wise as outlined in the provided Gauhati University curriculum.

Semester 1

COM0100104MJ: Introduction to C-Programming

- **CO1:** Understand the fundamentals of C programming, including data types, operators, expressions, input/output functions, and program structure.
- **CO2:** Apply control structures such as conditional statements and loops to develop logical and efficient C programs.
- **CO3:** Demonstrate the use of arrays and strings for storing, processing, and manipulating data in C.
- **CO4:** Develop modular programs using functions, pointers, dynamic memory allocation, and recursion to solve computational problems.
- **CO5:** Implement structures, unions, and file handling concepts to manage complex data and perform file processing operations in C.

Semester 2

COM0200104MJ: Computer Organization

- **CO1:** Describe the basic functional blocks of a computer.
- **CO2:** Discuss different ways to represent data in memory and arithmetic operations performed on the data.
- **CO3:** Explain the basic instruction set architectures of computers.
- **CO4:** Analyze the hierarchy of memory organization and Input-Output systems used in computers.
- **CO5:** Understand the basic architecture of the 8085 microprocessors.

Semester 3

COM0300104MJ: Object Oriented Programming using C++

- **CO1:** Define OOP and describe basic data types, different operators, control structures, function prototyping, and call-by-reference methods used in C++.
- **CO2:** Discuss the concepts of class, objects, memory allocation for objects, and constructors/destructors used in C++.

- **CO3:** Explain the concepts of function overloading and operator overloading.
- **CO4:** Illustrate the concepts of inheritance, polymorphism, and exception handling mechanisms.
- **CO5:** Design C++ programs to illustrate different concepts like classes, objects, constructors, inheritance, and virtual functions.

COM0300204MJ: Data Structure Using C/C++

- **CO1:** Distinguish between linear and nonlinear data structures.
- **CO2:** Explain different operations performed on arrays, linked lists, stacks, queues, and binary trees.
- **CO3:** Discuss different sorting and searching algorithms applied to data.
- **CO4:** Analyze the time complexity and space complexity of algorithms.
- **CO5:** Design C++ programs to demonstrate operations performed on different data structures.

Semester 4

COM0400104MJ: Database Management System

- **CO1:** Describe database management system architectures, types, advantages, and disadvantages.
- **CO2:** Apply Entity-Relationship (ER) modeling to real-world problems and map ER models to relational models.
- **CO3:** Interpret functional dependencies and categorize tables to specific normal forms.
- **CO4:** Analyze various concurrency problems that may occur in database design processes.
- **CO5:** Construct complex SQL queries to fetch, delete, update, and create data in DBMS software.

COM0400204MJ: Mathematical Foundation of Computer Science

- **CO1:** Define and describe sets, relations, functions, and their properties and operations.
- **CO2:** Associate with the principles of counting, inclusion-exclusion, induction, and their applications.
- **CO3:** Analyze the growth of functions and discuss asymptotic notations.

- **CO4:** Distinguish and create different graphs, and discuss their properties and applications.
- **CO5:** Solve problems revolving around mathematical logic, e.g., connectives, truth tables, tautologies, and contradictions.

COM0400304MJ: Operating System

- **CO1:** Identify different operating systems, their types, functions, and applications.
- **CO2:** Explain processes and threads, and solve process scheduling problems.
- **CO3:** Compare solutions for process synchronization methods.
- **CO4:** Discuss process deadlock handling techniques.
- **CO5:** Solve memory management issues and discuss memory management solutions.

COM0400404MJ: Java Programming (Elective Major Option)

- **CO1:** Describe Java programming constructs and operate different Java IDEs.
- **CO2:** Explain the working principles of various building blocks of the Java platform.
- **CO3:** Apply object-oriented approaches using the Java language to solve required programming problems.
- **CO4:** Differentiate various Java string and array methods and their usage.
- **CO5:** Design and develop GUI applications using advanced Java packages.

COM0400504MJ: Python Programming (Elective Major Option)

- **CO1:** Identify different keywords, operators, and input/output formatting in Python.
- **CO2:** Explain control statements and functions in Python.
- **CO3:** Apply object-oriented programming principles in Python.
- **CO4:** Analyze the use cases of Python libraries and their significance in various applications.
- **CO5:** Assess the robustness of Python code by applying exception handling and understanding database operation implications.

Semester 5

COM0500104MJ: Computer Networks

- **CO1:** Define the internet and describe different network topologies and types of networks.

- **CO2:** Discuss different transmission mediums, encoding methods, transmission modes, and switching techniques.
- **CO3:** Explain framing concepts, error control, stop-and-wait protocols, sliding window protocols, and MAC sublayer protocols.
- **CO4:** Illustrate IP addressing concepts, three-way handshaking, and DNS.
- **CO5:** Compare different routing algorithms used by the network layer.

COM0500204MJ: Software Engineering

- **CO1:** Identify different software development processes and their challenges.
- **CO2:** Explain software requirement specifications and translate them into implementable designs following a structured process.
- **CO3:** Apply software estimation metrics such as cost, effort size, and staffing.
- **CO4:** Design effective uses of UML alongside design strategies like software architecture and design patterns.
- **CO5:** Develop systems using object-oriented programming concepts.

COM0500304MJ: Web Technologies

- **CO1:** Define and describe the working principles of the internet and World Wide Web.
- **CO2:** Analyze web pages and identify their elements and attributes.
- **CO3:** Apply HTML and CSS in designing websites and web applications.
- **CO4:** Implement server-side functionality using PHP and JavaScript to create interactive web applications.
- **CO5:** Develop web projects, identify their elements/attributes, and build customized websites and web applications.

COM0500404MJ: Internship

- **CO1:** Explain industry workflows, best practices, and professional ethics in computing environments.
- **CO2:** Implement programming, debugging, or data analysis techniques in real-world projects.
- **CO3:** Evaluate system performance, identify inefficiencies, and suggest improvements.
- **CO4:** Develop projects or technical reports showcasing applied skills and problem-solving abilities.

Semester 6

COM0600104MJ: Automata Theory and Languages

- **CO1:** Define finite automata concepts and the languages accepted by them.
- **CO2:** Discuss regular grammars and the properties of regular languages.
- **CO3:** Explain Pushdown Automata (PDA) and the languages accepted by them.
- **CO4:** Analyze context-free language simplifications and normal forms.
- **CO5:** Formulate pumping lemmas for regular and context-free languages.

COM0600204MJ: Cloud Computing (Elective Major Option)

- **CO1:** Describe client-server architecture.
- **CO2:** Illustrate cloud computing architecture.
- **CO3:** Explain different Service Level Agreements (SLAs).
- **CO4:** Illustrate data management techniques and security methods used in cloud computing.
- **CO5:** Formulate case studies on open-source and commercial clouds.

COM0600304MJ: Compiler Design (Elective Major Option)

- **CO1:** Describe compilers, their phases, and working principles.
- **CO2:** Compute regular expressions, NFAs, and DFAs to recognize tokens.
- **CO3:** Design parsers such as top-down parsers and bottom-up parsers (LR, SLR, LALR).
- **CO4:** Explain intermediate representations (three-address codes, DAGs) and devise code optimization solutions.
- **CO5:** Develop lexical analyzers using Lex and parser generators using Yacc.

COM0600404MJ: Artificial Intelligence (Elective Major Option)

- **CO1:** Describe important historical and current trends addressing artificial intelligence.
- **CO2:** Identify and distinguish heuristic searching techniques.
- **CO3:** Apply logic programming concepts in AI.
- **CO4:** Assess performance and reliability associated with uncertainty and inconsistencies in AI systems.
- **CO5:** Analyze natural language structure and interpretation.

COM0600504MJ: Computer Graphics (Elective Major Option)

- **CO1:** Describe basic knowledge of core computer graphics input/output systems.
- **CO2:** Explain techniques for designing computer graphics software.
- **CO3:** Design and construct complex geometric models using advanced modeling techniques.
- **CO4:** Utilize visible surface detection algorithms to render realistic scenes.
- **CO5:** Apply basic illumination models to simulate lighting effects and enhance visual realism.

COM0600604MJ: Data Mining and Warehousing (Elective Major Option)

- **CO1:** Describe components and architecture of a data warehouse.
- **CO2:** Illustrate data mining techniques such as association rule mining, clustering, and classification.
- **CO3:** Develop algorithms like Apriori, Pincer Search, and DIC used in association rule mining.
- **CO4:** Explain the working principles of clustering and classification algorithms (K-Means, K-Medoids, PAM, DBSCAN, KNN).
- **CO5:** Analyze uses of web mining, text mining, big data mining, and neural networks.

COM0600704MJ: Project and Presentation

- As a project-based course, students apply comprehensive programming, design, and problem-solving methodologies acquired across semesters to engineer a functional software system or research prototype, culminating in a formal technical report and presentation.