



**KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)**

Re-accredited by NAAC with 'A+' Grade (4th Cycle)
College of Excellence (UGC) Coimbatore – 641 029



**DEPARTMENT OF COMPUTER SCIENCE WITH DATA
ANALYTICS**

COURSE OUTCOMES (CO)

For the students admitted in the Academic Year 2026 -2027

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Paper 1: Problem Solving using C Programming				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

COURSE OBJECTIVES

1. To understand the fundamentals of C programming language.
2. To apply control structures and operators in program development.
3. To develop programs using functions, arrays, and strings.
4. To learn pointers and memory management concepts.
5. To enhance problem-solving and programming skills through practical implementation.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Discuss the fundamentals of Computers, including their history, and exploring the various types of Software and Hardware devices.
	CO2	Gain the concepts of variables, constants, operators, and different types of expression.
	CO3	Utilize Decision-making statements and looping constructs to solve basic programming problems.
	CO4	Create the programs by employing enumerated data types, functions, unions and nested structures.
	CO5	Explore programs utilizing pointers and concepts related to File handling.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 1: Problem Solving using C Lab				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 3	Skill Development

COURSE OBJECTIVES

1. To introduce the fundamental concepts of C programming and develop programming proficiency.
2. To enhance analytical and problem-solving skills through C programming.
3. To understand the basic building blocks of the C programming language.
4. To develop programs using decision-making, looping, and functions.
5. To apply programming concepts to design and implement efficient solutions.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Engaging in the learning process aids in gaining a thorough understanding of C language concepts.
	CO2	Creating programs utilizing control and conditional statements, as well as switch cases.
	CO3	Utilize various basic programming constructs such as functions, strings, and pointers.
	CO4	Developing programs in C by employing the concept of structures and simulating the operation.
	CO5	Implementing concepts related to strings and file handling.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Paper 2 - Object Oriented Programming in Java				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

COURSE OBJECTIVES

1. To gain a deep understanding of Object-Oriented Programming concepts and basic characteristics of Java.
2. To learn the principles of methods, packages, inheritance and interface in Java.
3. To understand how to define exceptions and learn different I/O streams for file handling.
4. To learn to develop a Java application with threads and generics classes.
5. To become proficient in design and build simple Graphical User Interfaces.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Learn and create Java programs using object-oriented programming (OOPs) principles, variables, operators, and math functions.
	CO2	Gain experience and show skill in Java programming with methods, inheritance, and interfaces.
	CO3	Learn how to build Java applications using exceptions and I/O streams.
	CO4	Develop Java programs with threads and generics with flexible data types.
	CO5	Learn how to create interactive Java programs using Swing and AWT components.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 2 - Object Oriented Programming in Java Lab				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 3	Skill Development

COURSE OBJECTIVES

1. Students will gain proficiency in writing clean and efficient code with Java language syntax and semantics.
2. Students will learn the concepts of Object-Oriented Programming Paradigm and the programming constructs of JAVA.
3. Gain a deep understanding of Java programs using packages, inheritance, and interface concepts.
4. Develop the ability to implement Java concepts such as variables conditional and iterative execution methods.
5. Gain hands-on experience in implementing and analyzing graphical User interfaces using AWT.
6. Become proficient in analyzing and demonstrating event-handling mechanisms.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Apply the concepts of operators, control structures, inheritance, method overriding in Java.
	CO2	Implement the concept of interface, packages, multithreading and applets.
	CO3	Apply the various basic programming constructs of Java like decision-making statements. Looping statements, overloading, inheritance, polymorphism, constructors and destructors.
	CO4	Design programs using frames, menu bars, list boxes.
	CO5	Evaluate programs using various file stream classes, file types, and frames.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Paper 3 - Python Programming				
Batch 2026 - 2029	Hours/Week 4	Total Hours 60	Credits 4	Skill Development

COURSE OBJECTIVES

1. To understand Python fundamentals, gain a solid understanding of the core concepts and syntax of the Python programming language.
2. To acquire skills of master control flow structures such as if statements, loops, and nested statements to control the flow of program execution.
3. To learn how to define and call functions, pass arguments, and return values to write modular and reusable code.
4. To understand various data structures like lists, tuples, sets, dictionaries and learn how to manipulate them efficiently.
5. To acquire skills in reading from and writing to files, handling file objects, and managing file systems in Python.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Able to understand the fundamental concepts of Python programming.
	CO2	Able to write the Python operators, including the various types and their applications in statements and expressions. This knowledge will empower students to write Python programs proficiently and solve complex problems involving strings and lists across different applications.
	CO3	Able to demonstrate a comprehensive understanding of Python data structures, including tuples, sets, and dictionaries, along with their respective operations, methods, and looping mechanisms.
	CO4	Able to write Python programs that efficiently process numerical data, iterate through sequences, and implement modular and reusable code structures using functions and loops.
	CO5	Able to equip students to develop robust Python applications for various domains, from data analysis and visualization and File Concept to software development and beyond.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 3 - Python Programming Lab				
Batch 2026 - 2029	Hours/Week k 4	Total Hours 60	Credit s 3	Employability/ Skill Development

COURSE OBJECTIVES

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python.
6. Learn Syntax and Semantics and create Functions in Python

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	To develop proficiency in creating based applications using the Python programming Language.
	CO2	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
	CO3	To be able to do testing and debugging of code written in Python and to be able to draw various kinds of plots using PyLab.
	CO4	To be able to do text filtering with regular expressions in Python.
	CO5	To be able to create socket applications in Python and to create GUI applications in Python.

Programme Code:23	B.Sc Computer Science with Data Analytics			
Title of the Paper - Allied Paper 3: Distributed Operating System				
Batch 2026 - 2029	Hours / Week 6	Total Hours 90	Credits 5	Skill Development/ Employability

COURSE OBJECTIVE

1. To describe basic concepts of Operating System and Computer Networks.
2. To understand about naming, security, distributed file system.
3. To understand about message passing, remote procedure calls.
4. To understand the need of distributed shared memory, synchronization.
5. To understand the scope of resource, process management.

COURSE OUTCOME

K1 to K5	CO1	Gain knowledge of distributed operating system architecture.
	CO2	Illustrate principles and importance of distributed operating system.
	CO3	Implement distributed client server applications using remote method invocation.
	CO4	Distinguish between centralized systems and distributed systems.
	CO5	Create stateful and state-less applications.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the paper: Core paper 4: Fundamentals of Data Analytics				
Batch 2026 - 2029	Hours/Week 3	Total Hours 45	Credits 4	Employability

COURSE OBJECTIVES

1. To understand the various visualization techniques for data analytics.
2. To provide an overview of common text mining
3. To optimize business decisions and create competitive advantage with web data analytics
4. To provide solutions to the emerging problems with social media.
5. To understand the customer behavior, market trends, and protecting healthcare data.

COURSE OUTCOMES (CO)

K1 to K5	CO1	Understand the basics concepts of Data Analytics, Business Intelligence (BI)
	CO2	Apply a wide range of Classification, Clustering, Text mining techniques on Textual data
	CO3	Acquire knowledge of Web Analytics principles, understand the evolution, advantages, and limitations
	CO4	Understand the concept of social network data Analytics
	CO5	Understand the concept of Retail, Finance and Healthcare Analytics

Programme Code:23	B.Sc Computer Science with Data Analytics			
Title of the Paper - Core Practical 4: Data Analytics and its Applications Lab				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 3	Skill Development/ Employability

COURSE OBJECTIVES

1. Learn data cleaning, transformation, and visualization techniques.
2. Apply text pre-processing, feature extraction, and clustering methods.
3. Gain insights from user interactions and sentiment analysis.
4. Use machine learning for classification and trend forecasting.
5. Implement techniques to protect sensitive information.

COURSE OUTCOMES (CO)

K3 to K5	CO1	Understand data processing techniques, including data cleaning, transformation, and visualization.
	CO2	Apply text analytics methods such as text pre-processing, feature extraction, and clustering.
	CO3	Analyze web and social media data to extract insights from user interactions and sentiment analysis.
	CO4	Develop predictive models using machine learning techniques for classification and trend forecasting.
	CO5	Implement data security and privacy techniques to protect sensitive information.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Allied Paper 4: Design and Analysis of Algorithms				
Batch 2026 - 2029	Hours/Week 6	Total Hours 90	Credits 5	Skill Development

COURSE OBJECTIVES

1. To gain a deep understanding of fundamental concepts in algorithms.
2. To develop the ability to design efficient algorithms to solve complex computational problems.
3. To become proficient in analyzing the time and space complexity of algorithms Understand the implications of different complexity classes on algorithm efficiency.
4. To familiarize oneself with various algorithmic paradigms and techniques, such as divide and conquer, dynamic programming, greedy algorithms, and backtracking.
5. To learn the appropriate paradigm for solving specific problems and understand their limitations and advantages.
6. To develop strong problem-solving skills through algorithmic challenges and exercises.
7. To decompose complex problems into smaller, manageable sub problems and devise efficient algorithms to solve them.
8. To gain hands-on experience in implementing and analyzing algorithms to solve real-world problems.

COURSE OUTCOMES (CO)

K1 to K5	CO1	Understand and possess a comprehensive understanding of the fundamental principles underlying algorithm design, analysis, and the role of algorithms in computing.
	CO2	Understand and demonstrate proficiency in applying the Divide and Conquer paradigm to efficiently solve a wide range of computational problems, including sorting, searching, numerical computations, and geometric algorithms.
	CO3	Understand and prove proficiency in the application of Greedy Algorithms and Brute Force techniques to solve a diverse range of computational problems.
	CO4	Understand and demonstrate a comprehensive understanding of dynamic programming, greedy techniques, and hashing algorithms, along with their applications in solving complex computational problems efficiently.
	CO5	Understand and exhibit proficiency in applying advanced algorithmic techniques, including Backtracking, Iterative Improvement, Decision Trees, Branch and Bound, to tackle computationally challenging problems across various domains.

Programme Code: 23		B.Sc. Computer Science with Data Analytics		
Title of the Paper: Core Paper 5 - R Programming				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 3	Skill Development

COURSE OBJECTIVES

1. To understand the fundamental concepts of R Programming.
2. To develop advanced skills in Data Manipulation.
3. To acquire knowledge and skills in working with Data Frames, Factors, and Tables.
4. To understand the Object-Oriented Programming concepts in R.
5. To equip the students to Visualize and Analyses the Data using R.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Explain the basics in R programming in the terms of Data structure, Constructs, Control statements, String functions.
	CO2	Demonstrate about Matrices and Lists in R.
	CO3	Apply the Complex Data sets using Data Frames and Factors.
	CO4	Analyze the Object-Oriented Programming in R.
	CO5	Understand the Concepts of Interface R with Other Languages, Conduct Statistical Analysis and Clustering.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 5 - R Programming Lab				
Batch 2026 - 2029	Hours / Week 6	Total Hours 90	Credits 4	Skill Development

COURSE OBJECTIVES

1. To learn the installation and configuration of R and RStudio.
2. To understand the fundamentals of R programming.
3. To develop skills in data manipulation and analysis using R.
4. To apply R for exploratory data analysis and data visualization.
5. To enhance problem-solving and analytical skills through practical applications of R.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Understand the basics in R programming in terms of constructs, control statements, string functions.
	CO2	Develop skills in data manipulation and analysis.
	CO3	Learn exploratory data analysis techniques to derive insights from datasets
	CO4	Develop skills in creating informative graphs to represent data visually
	CO5	Enhance capability to handle diverse datasets effectively.

Programme Code: 23	B. Sc Computer Science with Data Analytics			
Title of the Paper: Core Paper 6 - Relational Database Management System				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 4	Skill Development

COURSE OBJECTIVES

1. To learn introduction of DBMS, RDBMS & basics of SQL commands including DDL and DML.
2. To gain a deep understanding of normalization, keys and ER models.
3. To familiarize the concepts of different joins and transactions.
4. To gain knowledge on PL/SQL, stored procedures and triggers.
5. To learn different types of databases like object oriented, distributed and SQL database.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understanding the concepts of DBMS, RDBMS and applying types of SQL commands.
	CO2	Understanding the concepts of Keys, Normalization and ER Models.
	CO3	Able to understand joins and transaction concepts.
	CO4	Understand the concepts of PL/SQL, procedures, triggers and exception handling.
	CO5	Understand different types of Databases and No SQL.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Core Practical 6 - Relational Database Management System Lab				
Batch 2026 - 2029	Hours / Week 6	Total Hours 90	Credits 4	Skill Development

COURSE OBJECTIVES

1. To understand the fundamentals of database systems and SQL.
2. To learn database design using Entity-Relationship (ER) modeling.
3. To develop skills in creating and managing relational databases.
4. To understand query processing and optimization techniques using SQL.
5. To apply database concepts for efficient data storage, retrieval, and management.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Designing the basic concepts of Database.
	CO2	Implementing Data Integrity constraints in Database.
	CO3	Validating the various fundamental tasks to perform Data Modeling.
	CO4	Implementing functions, packages, stored procedures and user defined exception.
	CO5	Applying various types of database management systems for developing the program.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Generative AI				
Batch 2026 - 2029	Hours/Week 1	Total Hours 15	Credits 1	Skill Development

COURSE OBJECTIVES

1. To introduce the fundamental concepts of Artificial Intelligence, including generative and discriminative approaches.
2. To understand the principles and processes of generative AI such as data generation, transformation, and enrichment.
3. To explore various generative models including autoencoders and GANs, along with their challenges and advancements.
4. To develop knowledge of prompt engineering, large language models (LLMs), and their scaling laws.
5. To analyse the growth, trends, and future directions of generative AI, including multimodal and multisensory systems.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Explain the basic concepts of AI and differentiate between generative and discriminative models.
	CO2	Apply generative AI techniques for data generation, transformation, and enrichment tasks.
	CO3	Analyze different generative models such as autoencoders and GANs, including their limitations and use cases.
	CO4	Demonstrate the use of prompt engineering techniques and understand the working of LLMs.
	CO5	Evaluate recent trends and advancements in generative AI, including multimodal and multisensory applications.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Core Paper 7 - Artificial Intelligence and its Applications				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 4	Skill Developme nt

COURSE OBJECTIVES

1. To learn the basics of Artificial Intelligence.
2. To develop problem-solving skill, logical reasoning and handling uncertainty problems.
3. To understand the search algorithms for games and constraint satisfaction problems.
4. To explore the AI techniques for knowledge representation, planning and managing uncertainty.
5. To gain the introductory knowledge in robotics.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understand the basic ideas and progress in AI.
	CO2	Describe the various problem-solving algorithms and search strategies to solve both toy and real-world problems.
	CO3	Apply the adversarial search algorithms for games and constraint satisfaction problems.
	CO4	Analyze the AI techniques for knowledge representation, reasoning, and planning techniques.
	CO5	Assess the robotics principles and their real-world applications.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 7 - Artificial Intelligence and Machine Learning Lab				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 4	Skill Development

COURSE OBJECTIVES

1. To learn to generate utility application using Java program in AI.
2. To apply appropriate algorithms for solving given AI problems.
3. To execute the basic search strategies in AI applications.
4. To develop the proficiency in text processing tasks using Python.
5. To implement the machine learning algorithms to solve real world problems.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Understand the utility applications like electricity billing systems using Java.
	CO2	Illustrate the problem-solving abilities by implementing backtracking and local search algorithms for complex problems.
	CO3	Apply the fundamental AI search strategies to find solutions in various applications, enhancing decision-making processes.
	CO4	Analyze the large text datasets efficiently using Python, enabling insights extraction and data manipulation.
	CO5	Execute the machine learning algorithms for practical applications like spam detection and fraud prevention.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Core Paper 8 - Machine Learning				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 4	Skill Development

COURSE OBJECTIVES

1. To understand the basics of Machine Learning (ML).
2. To understand the methods of Machine Learning.
3. To know about the implementation aspects of machine learning.
4. To understand the concepts of Data Analytics and Machine Learning.
5. To understand and implement use cases of ML.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understand the basics, Linearity and Non-Linearity in Machine Learning.
	CO2	Understand various Machine Learning methods regression, classification, SVM and its applications
	CO3	Demonstrate how to create an ML Model and learn about ML studio to create ML Applications.
	CO4	Explore knowledge of predictive Data Analytics and know-how information-based learning and similarity-based learning help for predictive data analytics.
	CO5	Understand about various ML applications.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Core Practical 8 - Data Visualization Lab				
Batch 2026 - 2029	Hours/Week 4	Total Hours 60	Credits 4	Skill Development /Employability

COURSE OBJECTIVES

1. To understand the concepts of MS –EXCEL in advance.
2. To represent complex datasets in a structured and understandable manner.
3. To understand the concepts of Data Analytics.
4. To apply advanced data modeling techniques in Power BI for business intelligence solutions.
5. To gain hands-on experience in deploying and sharing Power BI solutions.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Using advanced formulas to crunch data and analyses it to get simpler answers.
	CO2	Interpretation and Analysis of Data and Visual Reporting
	CO3	Understand how to analyze datasets and derive meaningful insights through visualizations, enhancing their analytical skills.
	CO4	Students will explore advanced DAX techniques, such as time intelligence functions, iterator functions, and context manipulation, to solve complex analytical problems.
	CO5	Explore how to publish dashboards to the Power BI service and share them with stakeholders, including configuring security settings and setting up scheduled data refresh.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Project and Viva Voce				
Batch 2026 - 2029	Hours/Week 4	Total Hours 60	Credits 5	Employability

COURSE OBJECTIVES

1. To identify and select suitable real-world problems based on domain knowledge and technical skills.
2. To develop analytical and problem-solving abilities for project implementation.
3. To apply theoretical concepts and programming skills in practical projects.
4. To gain hands-on experience in designing, developing, and testing solutions.
5. To build confidence and professional skills through real-time project execution.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Applying programming skill for solving the project.
	CO2	Analyzing the task and to collect the necessary information and software development
	CO3	Evaluating and Testing the task based on the software.
	CO4	Implementing the software for getting the Report.
	CO5	Implementing and analyzing real time project

Programme Code:23	B.Sc. Computer Science with Data Analytics			
Title of the paper: Major Elective - Internet of Things				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

1. To understand the fundamental concepts and architecture of IoT.
2. To learn the role and applications of sensors and actuators in IoT systems.
3. To study the communication protocols used in IoT design and implementation.
4. To explore IoT applications across various industrial and real-world domains.
5. To develop the ability to design and implement basic IoT-based solutions.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Identify the Various Concepts, Terminologies and Architecture of IoT Systems
	CO2	Understand the use of Sensors and Actuators for Design of IoT.
	CO3	Applying Various Protocols for Design of IoT Systems.
	CO4	Analyzing Various Techniques of Data Storage and Analytics in IoT.
	CO5	Evaluating the usage of IoT devices and its function in various Sectors.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Major Elective - Software Testing and Quality Assurance				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

1. To understand the fundamentals of software testing, test planning, and test design.
2. To learn various testing techniques and testing phases in the software development life cycle.
3. To develop skills in system testing, test execution, and defect identification.
4. To understand software quality assurance practices and quality metrics.
5. To apply defect prevention and quality improvement techniques in software projects.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Identify Software Testing Principles and fundamental concepts of software testing, including its purpose, objectives, and principles.
	CO2	Understand the Knowledge of Testing Techniques such as White-box testing, Black-box testing, UNIT testing, Integration testing, System testing, Regression testing, and Acceptance testing.
	CO3	Apply techniques of Integration Testing, its purpose, significance, and Principles of Integration testing in the Software Development Lifecycle.
	CO4	Analyze the uniqueness of Software Quality Assurance and distinctive aspects of software quality assurance compared to quality assurance in other domains, such as manufacturing.
	CO5	Evaluate Software quality metrics, Cost Metrics Responsibilities of Software Quality and Assurance.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Major Elective - Cloud Computing Fundamentals				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

1. To understand the Concepts of Cloud Computing.
2. To provide an in-depth and comprehensive knowledge of the Cloud Computing fundamental, technologies, applications and implementations.
3. To motivate students to do programming and experiment with the various cloud computing environments.
4. To shed light on the Security issues in Cloud Computing.
5. To introduce about the Cloud Standards.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Find the knowledge about cloud computing and the establishment of cloud concepts
	CO2	Understand the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
	CO3	Identify the core issues of cloud computing such as security, privacy, and management of cloud.
	CO4	Analyze the appropriate cloud computing solutions and recommendations according to the applications used.
	CO5	Evaluate about the cloud providers and their Functionalities,

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Major Elective - Digital Forensics				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

1. To introduce the principle and concepts of digital forensic.
2. To detail about the various investigation procedures like data acquisition and evidence gathering.
3. To understand the basics of digital forensics and the techniques for conducting the forensic examination on different digital devices.
4. To understand how to examine digital evidences such as the data acquisition, identification analysis.
5. To understand the various categories of tools and procedures used in the digital forensic process.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understand the foundations of digital forensics, covering its principles, methodologies, various types including networks and guidelines for first responders.
	CO2	Apply the procedural steps of Cyber Crime investigation, preservation, examination, analysis, documentation, reporting, and maintaining chain of custody.
	CO3	Analyzing the data acquisition techniques, email investigations, password cracking, preservation from encrypted systems, and addressing challenges in cybercrime investigations.
	CO4	Analyze on diverse data acquisition methods, spanning live, shutdown, and remote systems, email analysis, and navigating challenges in cybercrime investigations.
	CO5	Apply on Windows and Linux forensics, covering system artifacts and recover important evidence on Cyber Crime.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Major Elective - Natural Language Processing				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 5	Employability/ Skill Development/

COURSE OBJECTIVES

1. To learn the fundamental concepts and techniques of natural language processing.
2. To give a deep understanding of N-grams, part of speech tagging, and NLP Libraries.
3. To develop the ability to use CFG and PCFG in NLP.
4. To gain a deep understanding of the role of deep learning algorithms.
5. To analyze language models, types, and problems.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understand a given text with basic Language features, Language modeling, Regular expressions, Tokenization and applications.
	CO2	Understand and demonstrate about word level analysis, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging and NLP Libraries.
	CO3	Understand the concepts of Context-free grammars (CFG), parsing, probabilistic CFG.
	CO4	Understand and demonstrate a comprehensive understanding of deep learning algorithms, back propagation networks and autoencoders.
	CO5	Understand and possess a comprehensive understanding of the Discourse Processing and Language Modeling.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : Major Elective - Deep Learning				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 5	Employability/ Skill Development/

COURSE OBJECTIVES

1. To gain a deep understanding of the basic concepts and techniques of Deep Learning and TensorFlow.
2. To learn Convolutional Neural Networks, RNN and LSTM Neural Network with applications.
3. To get knowledge about Reinforcement Learning and Q Learning.
4. To develop an ability to design and implement Deep Learning algorithms for AI, Boltzmann Machines and Autoencoders.
5. To learn about data science, Deep Learning and Visualization of Neural Networks.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Understand the basic concepts and techniques of Neural Networks in Deep Learning.
	CO2	Understand and apply CNN, RNN and LSTM networks in applications.
	CO3	Understand and demonstrate a comprehensive understanding of Reinforcement Learning and Q Learning.
	CO4	Examine the foundations of Neural Networks, Perceptron's, Hopfield Nets.
	CO5	Explore and create Deep Learning applications with Data Science tools, Data modeling, and futurization.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Major Elective - Data Warehousing and Data Mining				
Batch 2026 - 2029	Hours/Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

- 1.To understand the fundamental concepts, algorithms, methods, and tools of data mining.
- 2.To develop critical thinking and problem-solving skills for data analysis.
- 3.To apply data mining techniques for knowledge discovery and decision making.
- 4.To identify and analyze meaningful patterns from large datasets.
- 5.To evaluate the performance and accuracy of data mining algorithms.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Familiarizing oneself with the principles and techniques of data mining.
	CO2	Comprehending the principles of processing raw data through the utilization of data mining algorithms.
	CO3	Acquiring proficiency in data mining algorithms for constructing analytical applications.
	CO4	Gaining information about the characteristics of Datamining and OLAP.
	CO5	Knowing about the applications in warehousing.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper: Major Elective - Cryptography and Information System				
Batch 2026 - 2029	Hours / Week 5	Total Hours 75	Credits 5	Employability/ Skill Development

COURSE OBJECTIVES

1. To understand the fundamentals of cryptography and network security concepts.
2. To learn various encryption techniques, message authentication, and confidentiality mechanisms.
3. To study digital signatures and authentication techniques for secure communication.
4. To identify network threats, vulnerabilities, and appropriate security countermeasures.
5. To apply cryptographic methods for ensuring confidentiality, integrity, and authenticity of information.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K1 to K5	CO1	Identify Security Protocols and the security of information systems by assessing the effectiveness of cryptographic protocols in protecting data confidentiality, and integrity.
	CO2	Understand Block Cipher principles, standards of DES, and Advanced Encryption Standards (AES).
	CO3	Apply HASH and Mac Algorithm, key management and public key Cryptographic principles.
	CO4	Analyze Authentication Applications and Combining Security Associations and Key Management.
	CO5	Evaluate effective skills in web security, threat mitigation strategies against intruders and firewall design principles to ensure robust protection of web-based systems.

Programme Code: 23		B.Sc. Computer Science with Data Analytics		
Title of the Paper : Skill Based Subject 2 - Web Design Lab				
Batch 2026 - 2029	Hours/Week 2	Total Hours 30	Credits 3	Entrepreneurship/ Skill Enhancement

COURSE OBJECTIVES

1. To learn to create well-structured, semantic HTML documents and style them effectively using CSS.
2. To gain proficiency in writing clean and efficient code, adhering to best practices in web development.
3. To introduce to JavaScript programming concepts and learn how to use it to enhance the interactivity and functionality of web pages.
4. To gain proficiency in using industry-standard web design tools such as HTML, CSS, JavaScript, and PHP frameworks to develop responsive and visually appealing websites.
5. To develop an ability to design and implement static and dynamic website and to develop skills in analyzing the usability of a web site.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Able to use the standard basic HTML tags.
	CO2	Able to use the images, Table and formatting tags to Design Web Pages.
	CO3	Able to use the CSS selectors and specificity, including the different types of CSS Style sheet in Web Pages.
	CO4	Able to use and Understand to Developing dynamic web pages using JavaScript.
	CO5	Able to use and Understand to analyze and build web applications using PHP and Integrate HTML forms to PHP scripts and SQL.

Programme Code: 23	B.Sc. Computer Science with Data Analytics			
Title of the Paper : EDC - Internet Basics and Advanced Excel Lab				
Batch 2026 - 2029	Hours/Week 2	Total Hours 30	Credits 3	Entrepreneurship/Skill Enhancement

COURSE OBJECTIVES

1. To introduce the fundamentals of Internet and the Web functions.
2. To impart knowledge and essential skills necessary to use the internet and its various components.
3. To find, evaluate, and use online information resources.
4. To use Google Apps for education effectively and to Create and develop various forms in Google.
5. To understand the concepts MS-Excel in advance.

COURSE OUTCOMES (CO)

After Completion of the Course the student will be able to

K3 to K5	CO1	Understand features of Internet and email
	CO2	Understanding and remember various menus in office automation
	CO3	Implementing the concepts of Internet techniques
	CO4	Using advanced formulas to crunch data and analyses it to get simpler answers.
	CO5	Interpretation and Analysis of Data and Visual Reporting