M.Sc. (Data Science and Analytics)

PROGRAMME OUTCOMES (POs)

POs	Description
PO01	Inculcate and nurture scientific thinking in various aspects of professional and personal life.
PO02	Translate the concepts learnt to find creative and innovative solutions to real life problems through inter and trans disciplinary approach.
PO03	Critically analyse and interpret data to provide valid conclusion and solutions.
PO04	Develop into socially responsible individuals and contribute effectively towards nation building.
PO05	Apply ethical principles and commit to professional ethics and responsibilities.
PO06	Demonstrate effective written and oral communication, leadership, and entrepreneurial qualities.
PO07	Develop into environmentally aware individuals with a mindset towards sustainability and eco-friendly solutions for regional, national and global concerns.
PO08	Engage in life-long learning the broadest content of scientific advancement.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of the program the student will be able to:

PSO	Description
PSO01	Acquire professional competencies, including basic computer literacy and programming skills, to enhance employability in professions related to data science.
PSO02	Understand mathematical, statistical and computer science procedures and apply the same to solve the real-life problems in various domains like finance, economics etc.
PSO03	Apply research-based innovative knowledge and research methodologies to make inferences to provide valid conclusions.
PSO04	Prioritize the needs of industries and research organizations by building a strong foundation and gaining hands-on experience.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Description
PEO1	Facilitating career advancement in diverse industrial establishments.
PEO2	Ensuring the design of viable, innovative data science solutions to real-world problems.
PE03	Enforcing efficient team leadership and ethical responsibility in data usage.
PEO4	Developing efficient technocrats, researchers, and entrepreneurs.

Course Outcomes (COs)

Course: Mathematical Methods for Data Science	Total Credits: 3	Semester: I

Course outcomes

CO1: Understand the concepts of linear transformation, relation between differential operators and behavior of improper integrals and its applications.

CO2: Solve problems on vector differential calculus, improper integrals and its applications.

CO3: Analyze the action of the operators on scalars and vectors and behavior of improper integrals and its application

CO4: Interpret the applications of Fourier transforms in the field of Data Science.

Course: Applied Probability Distributions	Total Credits: 3	Semester: I

Course outcomes

CO1: Outline the fundamental concepts related to probability distribution.

CO2: Extend the concept of random variables and their significance in probability theory.

CO3: Recognize the applications of discrete probability distributions.

CO4: Demonstrate the applications of continuous probability distributions.

CO5: Examine convergence theorem on random variables and in-depth knowledge of law of large numbers.

Course: Artificial Intelligence	Total Credits: 3	Semester: I

Course outcomes

CO1: Understand the basic concepts of AI Techniques and scope AI field.

CO2: Familiarize with various search algorithms for problem solving.

CO3: Assess the applicability, strengths and weaknesses of basic knowledge representation.

CO4: Gain knowledge on logic programming and role of planning system in AI.

CO5: Interpret the role of learning and expert systems.

Course: DBMS	Total Credits: 3	Semester: I

Course outcomes

CO1: Understand the basic concepts of RDBMS.

CO2: Evaluate the SQL queries for designing, manipulating the data in the database also about triggers in SQL

CO3: Compute the architectures and common features of the main types of NoSQL databases (key-value stores, document databases, column-family stores, graph databases)

CO4: Implement Advanced columnar data model functions for the real time applications

CO5: Apply Nosql development tools on different types of NoSQL Databases.

Course: Multivariate Data Analysis	Total Credits: 3	Semester: II

Course outcomes

CO1: Understand basic concepts in multivariate data analysis.

CO2: Demonstrate knowledge of multivariate normal distributions and their properties.

CO3: Apply multivariate tools like classification and principal component analysis for decision-making.

CO4: Use the knowledge of factor analysis concepts and implement them using R.

CO5: Explore cluster analysis as a multivariate tool and implement it in R.

Course: Machine Learning Techniques	Total Credits: 3	Semester: II

Course outcomes

CO1: Understand the basic concepts of Machine Learning.

CO2: Conceptualize the Bayesian decision theory and its applications.

CO4: Implementing practical experience in designing and Ensemble models in machine learning algorithms.

CO4: Evaluate the techniques and programming framework to obtain acceptable decisions for the real-world problems.

CO5: Apply Unsupervised Learning and clustering in Data Science.

Course: Essential Statistical Inference	Total Credits: 3	Semester: II

Course outcomes

CO1: Impart knowledge on the concept of sampling distributions.

CO2: Understand the statistical inference procedures in estimation of parameters.

CO4: Develop a good understanding on statistical testing of hypotheses in practice.

CO4: Conceptualize the testing of hypothesis procedure for non- parametric test.

CO5: Familiarize with the concept of Bayesian Inference.

Course: Advanced Data Visualization	Total Credits: 3	Semester: II

Course outcomes

CO1: Understanding the importance of Data Visualization, Infographics in combination with the grammar of graphics, and their utility in the domain of Analytics.

CO2: Implementing charts, graphs, and various other plots using R programming library ggplot2 and implementing EDA in R.

CO3: Analyze various web apps and dashboards to visualize the data using R shiny.

CO4: Evaluate various data visualization techniques using python and creation of web apps using Streamlit.

CO5: Applying Power BI knowledge to visualize data.

Course: Enterprise Guide to DataOps and MLOps	Total Credits: 3	Semester: III

Course outcomes

CO1: Analyse the concepts of DataOps and MLOps

CO2: Design and implement DataOps and MLOps architectures

CO3:Manage DataOps and MLOps projects from planning to deployment

CO4: Apply advanced technologies to optimize DataOps and MLOps

CO5: Implement production-grade DataOps and MLOps pipelines

Course: Deep Learning	Total Credits: 3	Semester: III

Course outcomes

CO1: Demonstrate the fundamental concepts of Deep Learning and its applications in various fields.

CO2: Design, train and optimize Convolutional Neural Networks for image classification tasks

CO3: Implement Recurrent Neural Networks (RNNs) for sequence processing tasks..

CO4: Apply Deep Learning models for various applications.

CO5: Evaluate and deploy deep learning models for various applications.

Course: Big Data Analytics	Total Credits: 3	Semester: III

Course outcomes

CO1: Describe the importance of Big Data Analytics challenges & opportunities.

CO2: Analyze the case studies related to real life situations and implementing programming

CO3: Gain conceptual understanding of Hadoop Distributed File System.

CO4: Implementing various Programming Languages - Programming Languages like Python, Scala, Java is required because it helps to understand Hadoop

CO5: Applying Basic knowledge of Linux working and its command

Course: Data Analytics with SAS	Total Credits: 3	Semester: III

Course outcomes

CO1: Demonstrate the fundamental concepts and principles essential for understanding SAS programming.

CO2: Apply the capabilities of the SAS language to merge data from diverse origins effectively.

CO3: Execute SAS functions for data cleansing, transformation, and the generation of summary statistics and reports.

CO4: Assess the core principles of data visualization and demonstrate proficiency in crafting meaningful visuals with SAS.

CO5: Develop SAS programs proficiently for conducting statistical analyses, encompassing descriptive statistics, linear regression, and logistic regression.

Course: Computer Vision and Image Analytics	Total Credits: 3	Semester: III

Course outcomes

CO1: Describe the foundation of image formation, measurement, and analysis.

CO2: Apply the preprocessing steps of Image processing.

CO3: Evaluate the various steps of Image Processing.

CO4: Analyse the features of image.

CO5: Apply video tracking and analysis.

Course: Data Cleaning	Total Credits: 3	Semester: III

Course outcomes

CO1: Create a program that manipulates basic data structures like Lists, Vectors, and Matrices using R programming.

CO2: Demonstrate proficiency in exploring, managing, and transforming diverse datasets through the application of various functions and techniques, ensuring data quality and analytical readiness.

CO3: Implement Tidy Verse Library within R Programming to clean and manipulate data.

CO4: Employ the use of Data Wrangling and Data Cleansing methodologies to obtain usable data from a cluttered set.

CO5: Develop scripts using dplyr and markdown within R to generate reports, ensuring data reproducibility.

DSE Course: Natural Language Processing	Total Credits: 3	Semester: IV

Course outcomes

CO1: Understand the basics of NLP.

CO2: Learning various steps of Text Processing

CO3: Deploy programs based on Semantics & Feature Extraction

CO4: Compute Classification & Clustering Algorithms

CO5: Evaluate the applications of NLP

DSE Course: Applied Regression and Experimental Design	Total Credits: 3	Semester: IV

Course outcomes

CO1: Demonstrate deeper understanding of the linear regression model.

CO2: Evaluate R-square criteria for model selection.

CO3: Understand the forward, backward and stepwise methods for selecting the variables.

CO4: Ability to use and understand generalized linear model using binary and count data.

CO5: Implement the research-based knowledge and research methods including design of experiments, analysis and interpretation of data.

Skill Course: Blockchain Technology	Total Credits: 2	Semester: IV

Course outcomes

CO1. Understand the basics of Blockchain technology and its various types.

CO2: Learn the fundamentals of cryptography and cryptocurrency.

CO3: Develop smart contracts applications

CO4: Analyze the security challenges, protocols, tools, and best practices of Blockchain technology.

CO5: Implement Blockchain development.

Course: Frontiers in Statistical Quality Control and Time Series Analysis	Total Credits: 3	Semester: IV

Course outcomes

CO1: Grasping the basic principles of Statistical Quality Control (SQC) and its applications.

CO2: Constructing control charts with the ability to choose suitable stability criteria.

CO3: Applying process capability indices to evaluate a process's performance.

CO4: Executing univariate time series applications with appropriate simplicity.

CO5: Compare key time series models, including Autoregressive (AR), Moving Average (MA), Autoregressive Integrated Moving Average (ARMA), and Autoregressive Integrated Moving Average with Seasonality (ARIMA).

Course: Internet of Things	Total Credits: 3	Semester: IV

Course outcomes

CO1. Understand the fundamentals of the Internet of Things (IoT) and its architecture.

CO2: Design, develop, and analyze RF communication systems for IoT applications.

CO3: Analyze strategies to optimize the performance of application layer protocols in IoT and modern networking.

CO4: Develop secure methods for data storage and transmission in IoT.

CO5: Evaluate the applications of IoT.

Course: Business Analytics	Total Credits: 3	Semester: IV

Course outcomes

CO1: Understand the basic concepts of Business Analytics.

CO2: Review, analyze and interpret data.

CO3: Learn techniques and methods used in predictive analytics.

CO4: Implement various real-world applications of Business Analytics.

CO5: Evaluate various models used in Business Analytics.