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PROGRAMME OUTCOMES

Programme Code: -	**Name of the Programme: B.Sc. Data Science**

Programme Outcomes:
After successful completion of the programme, graduates will be able to;

PO1: Build a strong foundation of statistics for data science.

PO2:Utilize Python and R's latest features for robust data science, leveraging SciPy's advanced capabilities in integration, optimization, statistics, I/O, and weaving.

PO3:Gain expertise in mathematical computing using the NumPy and Scikit-Learn package.

PO4:Gain an in-depth understanding of data structure and data manipulation.

PO5:Understand and use linear and non-linear regression, classification techniques, and both supervised and unsupervised learning models.

PO6:Master the concepts recommendation engine, time series modelling, gain practical mastery over principles, algorithms, and applications of Machine Learning.

PO7: Learn to analyse data using Tableau and Power BI and become proficient in building interactive dashboards.

PO8: Understand deep reinforcement learning techniques applied in Natural Language Processing.

PO9: Understand the different components of the Hadoop ecosystem and learn to work with H Base, its architecture and data storage, learning the difference between H Base and RDBMS, and use Hive and Impala for partitioning.

PO10:Understand Map Reduce and its characteristics and learn how to ingest data using Sqoop and Flume.

COURSE OUTCOMES

SEMESTER I	
COURSE CODE : USDS101	COURSE TITLE: Descriptive Statistics

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand the use and importance of statistical data by tabulating and implementing sampling methods.(2)*

CO2: Identify association between the variables as well as computing consistent and in consistent data. (1)*

CO3: Compute level of measures and apply as well as interpret data into graphs.(3)*

CO4: Apply measure of central tendency to minimize the sum of squared deviation. (3)*

CO5: Understand regression analysis assumptions, assess model significance, and apply diverse modelling techniques. (2)*

SEMESTER I	
COURSE CODE : USDS102	COURSE TITLE: Introduction to Programming

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Apply various data types .(3)*

CO2: Use regular expressions to perform complex operations in less code. (3)*

CO3: Make use of date and time in Python for various applications. (3)*

CO4: Use I Python architecture for Data Science Applications. (3)*

CO5: Understand use of various data science tools. (2)*

SEMESTER I	
COURSE CODE : USDS103	COURSE TITLE: Web Technology

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand web technology basics, explore HTML5 concepts, and grasp essential web design principles. (2)*

CO2: Use the Page layout, Navigation, Tables, Forms and Media features of HTML5. (3)*

CO3: Use Cascading Style sheet for beatifying the web pages. (3)*

CO4: Use the Java Script for validation of user forms in web pages. (3)*

CO5:Use the technique of transmitting data between a server and web application using JSON. (3)*

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SEMESTER I	
COURSE CODE : USDS104	COURSE TITLE: Business Communication and Information Ethics

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Communicate effectively in daily life as well as in the business world. (3)*

CO2: Apply the information ethics in all walks of life. (3)*

CO3: Draft persuasive and coherent business letters demonstrating professionalism and clarity.(6)*

CO4: Write elegant business reports and prepare user instruction manual.(6)*

CO5: Effectively carry out communication activities of business by following email etiquette, drafting memos. (3)*

SEMESTER I	
COURSE CODE : USDS105	COURSE TITLE: Precalculus

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Apply the knowledge of numbers, graphs and functions in real life. (3)*

CO2: Apply trigonometry in modelling real life problems. (3)*

CO3: Use analytic trigonometry and inverse circular functions to solve a variety of problems. (2)*

CO4: Apply complex numbers theory to different domains, using vectors and matrices to solve real life problems. (3)*

CO5: Identify different types of conics from equations, understand sequences and series and basics of limits and derivatives.(1)*

SEMESTER I	
COURSE CODE : USDS1P1	COURSE TITLE: Descriptive Statistics Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand excel functions and add-ins for statistical analysis and mathematical calculations. (2)*

CO2: Master data entry, manipulation, and tabular formatting techniques in Excel. (3)*

CO3: Analyze data central tendency and dispersion measures using Excel tools and formulas.(4)*

CO4: Create effective graphical presentations and interpret correlation and regression analyses.(6)*

CO5: Apply forecasting techniques and draw conclusions from regression analysis using real-world data. (3)*

SEMESTER I	
COURSE CODE : USDS1P2	COURSE TITLE: Introduction to Programming Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand input and output functions in python and use loops and control their execution. (2)*

CO2: Develop modular programs using functions and data types like string, array and list of Python. (6)*

CO3: Develop modular programs using Date and Time of Python. (6)*

CO4: Make use of the NumPy Package and the different functions available in it. (3)*

CO5: Write code using the Pandas Package and different functions available in it.(3)*

SEMESTER I	
COURSE CODE : USDS1P3	COURSE TITLE: Web Technology Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use basic tags such as font, link and text formatting tags. (3)*

CO2: Apply navigation, lists, images etc. in web pages. (3)*

CO3: Use user controls and embed multimedia on web page. (3)*

CO4: Apply CSS with list, links, fonts table etc. on web page. (3)*

CO5: Apply Java Script for Validating User fields on web-page. (3)*

SEMESTER I	
COURSE CODE : USDS1P4	COURSE TITLE: ICT Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use ICT software for different purposes in all walks of life. (3)*

CO2: Develop the appropriate personal skills that are essential for independent learning based around ICT. (6)*

CO3: Enhance learning by prioritizing higher-order cognitive tasks and fostering a positive attitude towards ongoing education.(2)*

CO4: Facilitate better communication between learners, thereby promoting greater social understanding and harmony.(3)*

CO5: Use ICT tools effectively in governance, agriculture and health care. (3)*

SEMESTER I	
COURSE CODE : USDS1P5	COURSE TITLE: Precalculus Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Apply the knowledge of numbers, graphs and functions in real life. (3)*

CO2: Apply trigonometry in modelling real life problems. (3)*

CO3: Use analytic trigonometry and inverse circular functions to solve a variety of problems. (3)*

CO4: Apply complex numbers theory to different domains, using vectors and matrices to solve real life problems. (3)*

CO5: Identify different types of conics from equations, understand sequences and series and basics of limits and derivatives. (2)*

SEMESTER II	
COURSE CODE : USDS101	COURSE TITLE: Probability and Distributions

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Organize, manage and present data. (3)*

CO2: Analyse statistical data graphically using frequency distributions and cumulative frequency distributions. (4)*

CO3: Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events. (3)*

CO4: Translate real-world problems into probability models. (3)*

CO5: Derive the probability density function of transformation of random variables. (3)*

SEMESTER II	
COURSE CODE : USDS102	COURSE TITLE: Database Management

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Evaluate business information problems and find the requirements of a problem in terms of data. (5)*

CO2: Draw data base design in a logical structure and can identify the entities which exist in a system. (3)*

CO3: Construct normalized database and functional dependencies between attributes and relational algebra queries. (3)*

CO4: Design the database schema with the use of appropriate data types for storage of data in database. (3)*

CO5: Create, manipulate, query and back up the data bases with features of SQL. (6)*

SEMESTER II	
COURSE CODE : USDS103	COURSE TITLE: R Programming

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use R Studio and explore the features for R programming. (3)*

CO2: Use R functions and graphics within R programming for solving problems. (3)*

CO3: Work with advanced graphics of R, import and use the data and represent the data into tables. (3)*

CO4: Apply formatting on table, use Pipelines in application and use strings, factors in R programme. (3)*

CO5: Manipulate Data Frames and make use of Dates in R application. (3)*

SEMESTER II	
COURSE CODE : USDS104	COURSE TITLE: Environmental Science

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand major environmental challenges facing our planet. (2)*

CO2: Understand the concept of sustainability. (2)*

CO3: Understand environmental policies, regulations, and governance frameworks. (2)*

CO4: Develop a sense of environmental stewardship and responsibility towards the environment. (3)*

CO5: Become agents of positive environmental changes by understanding of human-environment interactions. (3)*

SEMESTER II	
COURSE CODE : USDS105	COURSE TITLE: Calculus

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Find the derivative of a function.(3)*

CO2: Perform integration of functions with ease.(3)*

CO3:Apply the knowledge of derivatives and integration to different domains and obtain the results.(3)*

CO4:Apply the knowledge of multiple integrals and polar coordinates to solve real life problems with ease.(3)*

CO5: Use partial derivatives and differential equations to solve a variety of problems. (3)*

SEMESTER II	
COURSE CODE : USDS1P1	COURSE TITLE: Probability and Distributions Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use discrete and continuous probability distributions for making decisions. (3)*

CO2: Define binomial outcomes and compute the probability of getting X successes in Ntrials. (2)*

CO3: Use the normal probability distribution, including standard normal curve calculations of appropriate areas. (3)*

CO4: Use different distributions to solve practical problems.(3)*

CO5: Derive the probability density function of transformation of random variables.(3)*

SEMESTER II	
COURSE CODE : USDS1P2	COURSE TITLE: Database Management Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Draw relationship diagram. (3)*

CO2: Perform various operations such as insert, update, delete and retrieve data from database using SQL queries. (3)*

CO3: Perform alteration in tables and can restore and take backup of the database.(3)*

CO4: Perform operations using simple SQL Queries to fetch data and learn various aggregate functions to get single value. (3)*

CO5: Perform SQL queries using JOIN keyword for joining two or more tables.(3)*

SEMESTER II	
COURSE CODE : USDS1P3	COURSE TITLE: R Programming Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use R object, simple statistical function for data analysis and differentiate between linear and multiple regression analysis. (3)*

CO2: Understand various functions for Normal and Binomial Distribution and able to implement and analyse data using different time intervals and multiple time series. (2)*

CO3: Create Tabulation for presentation of data and operation of them and get the knowledge about various ways of plotting data and saving them. (3)*

CO4: Analyze performance of the R code. (4)*

CO5: Develop skills to manage multiple data through various options available in R.(3)*

SEMESTER II	
COURSE CODE : USDS1P4	COURSE TITLE: Project Presentation on Data Science in Environmental Science

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand major environmental challenges facing our planet. (2)*

CO2: Understand the concept of sustainability.(2)*

CO3: Understand environmental policies, regulations, and governance frameworks.(2)*

CO4: Develop a sense of environmental stewardship and responsibility towards the environment.(2)*

CO5: Become agents of positive environmental changes by understanding of human-environment interactions.(3)*

SEMESTER II	
COURSE CODE : USDS1P5	COURSE TITLE: Calculus Tutorials

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Apply the concepts of limits, derivatives, and integrals.(3)*

CO2: Master differentiation and integration techniques.(3)*

CO3:Solve real-world problems using calculus principles.(3)*

CO4:Enhance analytical and critical thinking skills.(4)*

CO5: Prepare for advanced study in mathematics and related fields.(3)*

SEMESTER III	
COURSE CODE : USDS101	COURSE TITLE: Research Methods And Ethics

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand the reasons for doing research, the applications of research, characteristics and requirements of the research process, types of research and research paradigms.(2)*

CO2: Apply major approaches to information gathering, the relationship between attitudinal and measurement scales methods for exploring attitudes in research.(3)*

CO3: Analyze data in qualitative and quantitative studies, application of IT in data analysis.(4)*

CO4: Write a research report and use Information Technology in research.(2)*

CO5: Apply ethical codes and practices for conducting research.(3)*

SEMESTER III	
COURSE CODE : USDS102	COURSE TITLE: Research Methods And Ethics Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Choose appropriate data structure in Python for specified problems and algorithms.(3)*

CO2: Implement Linked list and Stack data structure in various domains.(3)*

CO3:Implement Tree and Queue data structures and use their operation.(3)*

CO4:Apply Hashing techniques, Symbol Table and Graph Algorithms appropriately.(3)*

CO5: Practice ethical codes and practices for conducting research.(3)*

SEMESTER III	
COURSE CODE : USDS103	COURSE TITLE: Linear Algebra And Discrete Mathematics

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Perform common matrix operations such as addition, scalar multiplication, multiplication, and transposition.(3)*

CO2: Describe how the determinant of a product of matrices relates to the determinant of the individual matrices.(2)*

CO3: Understand the concept of a _solution to a game' and also the limitations on the applicability of the theory.(2)*

CO4: Compute eigenvalues and eigenvectors, crucial for various mathematical applications.(3)*

CO5: Apply linear algebra in optimization problems and game theory, enhancing decision-making skills.(3)*

SEMESTER III	
COURSE CODE : USDS104	COURSE TITLE: Linear Algebra And Discrete Mathematics Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Apply matrix manipulation techniques for efficient solution of linear equations.(3)*

CO2: Apply vector spaces in analyzing real-world problems.(3)*

CO3: Apply orthogonal concepts for accurate projections and least squares solutions.(3)*

CO4: Compute eigenvalues and eigenvectors, crucial for various mathematical applications.(3)*

CO5: Apply linear algebra to optimization problems and game theory.(3)*

SEMESTER III	
COURSE CODE : USDS105	COURSE TITLE: Economics

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand the basic economic decisions that underline the economic process.(2)*

CO2: Apply the concepts of scarcity, choice and opportunity cost to analyze the workings of a market economy. (3)*

CO3: Demonstrate a firm knowledge of the interrelationships among consumers, government, business and the rest of the world in the U.S. macro economy.(3)*

CO4: Understand how the nation's output is measured via national income and product accounts, grasping both income and expenditure approaches.(2)*

CO5: Understand how monetary and fiscal policies shape economic policy, stabilize the economy, and achieve goals like controlling inflation, promoting employment, and fostering growth.(2)*

SEMESTER III	
COURSE CODE : USDS1P1	COURSE TITLE: Economics Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand the basic economic decisions that underline the economic process.(2)*

CO2: Apply the concepts of scarcity, choice and opportunity cost to analyze the workings of a market economy.(3)*

CO3: Demonstrate a firm knowledge of the interrelationships among consumers, government, business and the rest of the world in the U.S. macro economy.(3)*

CO4: Understand how the nation's output is measured via national income and product accounts, grasping both income and expenditure approaches.(2)*

CO5: Understand how monetary and fiscal policies shape economic policy, stabilize the economy, and achieve goals like controlling inflation, promoting employment, and fostering growth.(2)*

SEMESTER III	
COURSE CODE : USDS1P2	COURSE TITLE: Data Warehousing And Mining

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand business intelligence, data warehouse and establish the relationship between architectural building blocks.(2)*

CO2: Elaborate changing dimensions with respect to current trends & using aggregate tables.(2)*

CO3: Handle the processes of data pre-processing, data transformation and data reduction.(3)*

CO4: Apply Data Mining techniques for classification and clustering.(3)*

CO5: Apply Data Mining techniques for analyzing the datasets.(3)*

SEMESTER III	
COURSE CODE : USDS1P3	COURSE TITLE: Data Warehousing And Mining Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand data warehouses and business intelligence, distinguishing architectural types and illustrating building block relationships.(2)*

CO2: Discuss shifting dimensions with current trends and use aggregate tables effectively.(2)*

CO3: Manage the data reduction, transformation, and pre-processing procedures.(3)*

CO4: Use different data mining techniques for clustering and classification.(3)*

CO5: Use R, Python, or Weka, the learner is able to align data mining strategies for dataset analysis.(3)*

SEMESTER III	
COURSE CODE : USDS1P4	COURSE TITLE: Data Structures And Algorithms Using Python

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Choose appropriate data structure in Python for specified problems and algorithms.(2)*

CO2: Implement Linked list and Stack data structure in various domains.(3)*

CO3: Implement Tree and Queue data structures and use their operation.(3)*

CO4: Apply Hashing techniques, Symbol Table and Graph Algorithms appropriately.(3)*

CO5: Apply ethical codes and practices for conducting research.(3)*

SEMESTER III	
COURSE CODE : USDS1P5	COURSE TITLE: Data Structures And Algorithms Using Python Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Choose appropriate data structure in Python for specified problems and algorithms.(3)*

CO2: Implement Linked list and Stack data structure in various domains.(3)*

CO3: Implement Tree and Queue data structures and use their operation.(3)*

CO4: Apply Hashing techniques, Symbol Table and Graph Algorithms appropriately.(3)*

CO5: Apply ethical codes and practices for conducting research.(3)*

SEMESTER IV	
COURSE CODE : USDS101	COURSE TITLE: Testing of Hypothesis

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Develop null and alternative hypotheses to test for a given situation.(3)*

CO2: Differentiate one- and two-tailed hypothesis tests.(4)*

CO3:Do sampling a normal distribution and random sampling.(3)*

CO4:Use statistical models and their associations in performing hypothesis testing.(3)*

CO5:Write the reports and interpret the data using the various programming languages and packages.(6)*

SEMESTER IV	
COURSE CODE : USDS102	COURSE TITLE: Testing of Hypothesis Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Perform hypothesis testing, including formulation, execution, and interpretation using various statistical methods and p-values.(3)*

CO2:Use statistical packages (e.g., R, Python, Excel) for hypothesis testing and decision-making.(3)*

CO3:Implemente statistical functions using various programming tools.(3)*

CO4:Conduct and interpret ANOVA, MANOVA, ANCOVA, and non-parametric ANOVA tests using appropriate statistical tools.(3)*

CO5: Communicate analytical results through structured reports.(3)*

SEMESTER IV	
COURSE CODE : USDS103	COURSE TITLE: Big Data

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand fundamental techniques and algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.(2)*

CO2: Use fundamental techniques and algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.(3)*

CO3:Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.(3)*

CO4:Understand adequate perspectives of big data analytics in various applications.(2)*

CO5: Learn different machine learning concepts which are useful for analyzing complicated datasets.(2)*

SEMESTER IV	
COURSE CODE : USDS104	COURSE TITLE: Big Data Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand big data management and the ways in which intelligent business and scientific computing can use it.(2)*

CO2: Use big data analytics methods and algorithms including Hadoop, Map Reduce, and NO SQL.(3)*

CO3:Apply software tools for big data analytics and analyze business models and scientific computing concepts.(3)*

CO4:Understand big data analytics from a variety of applications.(2)*

CO5: Learn different machine learning concepts which are useful for analyzing complicated datasets.(2)*

SEMESTER IV	
COURSE CODE : USDS105	COURSE TITLE: Fundamentals of Accounting

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand basic accounting principles and their application.(2)*

CO2: Apply accounting principles to create journal entries and maintain ledgers.(3)*

CO3: Understand subsidiary books for both cash and credit transactions.(2)*

CO4:Understand the reconciliation of bank statements and Cash Book.(2)*

CO5: Understand finalisation of accounts through trial balance & final account.(2)*

SEMESTER IV	
COURSE CODE : USDS1P1	COURSE TITLE: Fundamentals of Accounting Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand basic accounting principles and their application.(2)*

CO2: Apply accounting principles to create journal entries and maintain ledgers.(3)*

CO3: Understand subsidiary books for both cash and credit transactions.(2)*

CO4:Understand the reconciliation of bank statements and Cash Book.(2)*

CO5: Understand finalisation of accounts through trial balance & final account.(2)*

SEMESTER IV	
COURSE CODE : USDS1P2	COURSE TITLE: Artificial Intelligence

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Understand the building blocks of AI.(2)*

CO2: Analyse problem and solve it by implementing suitable techniques.(4)*

CO3:Apply logic-based techniques to solve examples.(3)*

CO4:Implement Bayesian approaches.(3)*

CO5:Use machine learning concepts for solving problems.(3)*

SEMESTER IV	
COURSE CODE : USDS1P3	COURSE TITLE: Artificial Intelligence Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Recall the building blocks of AI to understand its fundamental concepts.(1)*

CO2: Assess and analyze problems to evaluate suitable techniques for solving them.(4)*

CO3:Apply logic-based approaches to assess examples and solve problems effectively.(3)*

CO4:Apply Bayesian approaches and machine learning concepts in problem-solving scenarios.(3)*

CO5: Evaluate the effectiveness of techniques by analyzing their impact on solving real-world problems.(5)*

SEMESTER IV	
COURSE CODE : USDS1P4	COURSE TITLE: Numerical Methods

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Implemente Numerical Methodsto solve the problems.(3)*

CO2: Compute the numerical results using raw data.(3)*

CO3:Understand numerical difference and integration.(2)*

CO4:Understand Numerical Solution of Initial-Value.(2)*

CO5: Understand Matrix Eigenvalue.(2)*

SEMESTER IV	
COURSE CODE : USDS1P5	COURSE TITLE: Numerical Methods Practical

Course Outcomes: After successful completion of the course, students will be able to;

CO1: Use numerical solution techniques.(3)*

CO2: Use curve fitting techniques.(3)*

CO3:Solve linear systems with Gauss elimination, LU factorization, and iterative methods.(3)*

CO4:Understand numerical differentiation and integration methods.(2)*

CO5: Solve initial-value and boundary-value problems using various numerical methods.(3)*

* Note: Numbers given in the brackets () refer to learning levels of the revised Blooms' Taxonomy (2001) as follows:

(1): Remember,(2): Understand, (3): Apply (4): Analyse (5): Evaluate (6): Create

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