



## **COURSE OUTCOMES (COs)**

### **Semester: IV**

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| <b>Course Name: Introduction to Discrete Structure &amp; Linear Algebra</b> |                                                                                                                                                                                                                                              | <b>Course Code: CD 401</b> |
| <b>Students will be able to:</b>                                            |                                                                                                                                                                                                                                              |                            |
| <b>CO1:</b>                                                                 | Comprehend and apply the fundamental concepts of set theory, relations, and functions. Understand theorem-proving techniques, including mathematical induction                                                                               |                            |
| <b>CO2:</b>                                                                 | Analyze different algebraic structures (such as semi-groups, monoids, groups, rings, and fields). Formulate and evaluate propositions, predicates, and logical proofs.                                                                       |                            |
| <b>CO3:</b>                                                                 | Solve combinatorial problems. Apply graph theory concepts (paths, cycles, graph coloring, and connectivity) to model and solve computational problems                                                                                        |                            |
| <b>CO4:</b>                                                                 | Perform matrix computations and solve systems of linear equations. Understand and apply advanced linear algebra concepts, including Eigen-decomposition and Singular Value Decomposition (SVD), which are vital for machine learning and AI. |                            |
| <b>CO5:</b>                                                                 | Formulate statistical hypotheses, evaluate errors (Type-I and Type-II), and apply analysis of variance (ANOVA) and time series analysis to real-world data                                                                                   |                            |

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| <b>Course Name: Analysis &amp; Design of Algorithms</b> |                                                                                                                                                                                | <b>Course Code: CD 402</b> |
| <b>Students will be able to:</b>                        |                                                                                                                                                                                |                            |
| <b>CO1:</b>                                             | Understand and analyze the performance of recursive and non-recursive algorithms, and use asymptotic notations to measure their time and space complexity                      |                            |
| <b>CO2:</b>                                             | Evaluate and interpret standard probability distributions (e.g., Binomial, Poisson, Normal, Exponential, Gamma) to model real-world engineering and traffic network scenarios. |                            |
| <b>CO3:</b>                                             | Identify, design, and analyze different algorithmic techniques such as Divide and Conquer, Greedy methods, and Dynamic Programming to solve computational problems.            |                            |
| <b>CO4:</b>                                             | Understand lower bound theory, parallel algorithms, and basic non-deterministic algorithms                                                                                     |                            |
| <b>CO5:</b>                                             | Analyze nonlinear data structures and identify the complexities of NP-Hard, NP-Complete, and other computationally intractable problems                                        |                            |



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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING -DATA SCIENCE**

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| <b>Course Name : SOFTWARE ENGINEERING</b> |                                                                                                                                                           | <b>Course Code: CD 403</b> |
| <b>Students will be able to:</b>          |                                                                                                                                                           |                            |
| <b>CO1:</b>                               | Understand the fundamental concepts of software engineering, including software processes, lifecycles (like Waterfall and Agile), and project feasibility |                            |
| <b>CO2:</b>                               | Apply requirements engineering techniques to identify, analyze, and specify software requirements (Software Requirement Specification - SRS)              |                            |
| <b>CO3:</b>                               | Design software architectures and components using structured methodologies and Object-Oriented Analysis (OOA) concepts                                   |                            |
| <b>CO4:</b>                               | Implement software testing strategies and quality assurance, utilizing both black-box and white-box testing methods.                                      |                            |
| <b>CO5:</b>                               | Analyze project scheduling, risk management, and software maintenance to ensure delivery of reliable, maintainable systems                                |                            |

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| <b>Course Name : Database Management Systems</b> |                                                                                                                                           | <b>Course Code: CD 404</b> |
| <b>Students will be able to:</b>                 |                                                                                                                                           |                            |
| <b>CO1:</b>                                      | Understand the fundamental concepts of Data Science, the data science life cycle, and the essential skills required for a data scientist. |                            |
| <b>CO2:</b>                                      | Apply data collection, cleaning, and pre-processing techniques to prepare raw datasets for analytical modeling.                           |                            |
| <b>CO3:</b>                                      | Analyze data using statistical methods (e.g., probability, central tendency, regression, and hypothesis testing).                         |                            |
| <b>CO4:</b>                                      | Implement basic machine learning algorithms and build predictive models.                                                                  |                            |
| <b>CO5:</b>                                      | Create comprehensive data visualizations to communicate analytical findings and actionable insights                                       |                            |



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| <b>Course Name: OPERATING SYSTEMS</b> |                                                                                                                | <b>Course Code: CD 405</b> |
| <b>Students will be able to:</b>      |                                                                                                                |                            |
| <b>CO1:</b>                           | Comprehend the basic services, functions, and architectures of operating systems                               |                            |
| <b>CO2:</b>                           | Identify and evaluate various design choices and issues associated with operating systems                      |                            |
| <b>CO3:</b>                           | Apply concepts of process scheduling, synchronization (such as semaphores and monitors), and deadlock handling |                            |
| <b>CO4:</b>                           | Understand multithreading, memory management (paging, segmentation), and disk/file system organization         |                            |
| <b>CO5:</b>                           | Analyze and implement security and protection mechanisms to ensure system integrity                            |                            |

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| <b>Course Name: PYTHON FOR DATA SCIENCE</b> |                                                                                                                                  | <b>Course Code: DS 406</b> |
| <b>Students will be able to:</b>            |                                                                                                                                  |                            |
| <b>CO1:</b>                                 | Master core Python data types, sequences (strings, tuples, lists, dictionaries), and object-oriented programming (OOP) concepts. |                            |
| <b>CO2:</b>                                 | Utilize NumPy and Pandas libraries for array-based numerical computation and dataframe manipulation.                             |                            |
| <b>CO3:</b>                                 | Perform data wrangling by combining, merging, reshaping, and transforming unstructured or complex datasets.                      |                            |
| <b>CO4:</b>                                 | Implement exploratory data analysis (EDA) and visualize large datasets using Python libraries like Matplotlib and Seaborn        |                            |
| <b>CO5:</b>                                 | Apply these Python scripting skills to clean, process, and extract actionable insights from real-world datasets                  |                            |

**Approved By:-  
Head of Department**