Classification of Listening; Purpose of Listening; Common Barriers to the Listening Process; Measures to Improve Listening; Listening as an Important Skill in Workplace, Language for Communication: Language and Communication; General Principles of Writing; Improving Writing Skills; Essentials of good style; Expressions and words to be avoided; Grammar and Usage, Communication in Organizations: Internal Communication; Stakeholders in Internal Communication; Channels of Internal Communication; External Communication; Stakeholders in External Communication; Channels of External Communication, Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication, Writing Business Letter: Importance of Business Letters; Difference between Personal and Business Letters; Structure and Format of Business Letters; Types of Business Letters.

DS1110	Academic Integrity	TH	-	-
Introduction to academic integrity, Academic integrity policies, Plagiarism, collusion and contract cheating, putting academic integrity into practice, Research ethics, Citing and referencing, Reading and Note-making, Critical Thinking				

DS-EGP-1101	General English I	TH	-	-
Refer English Curriculum (Page 88 & 89)				

Semester II				
DS2101	Operating Systems	TH	PRS	-
Operating Systems Overview (Historical development, Operating system objectives and functionalities, Major achievements). Process & Thread Management (Process concepts, Thread concepts, Descriptions, structures, and controls, Multiprocessors and Multi Thread programming). CPU Scheduling. Concurrency Control (Mutual exclusion, Synchronization, Deadlock, Starvation). Memory Management (Multiprogramming and partitions, Paging and segmentation, Virtual memory, Demand paging, Page replacement algorithms). I/O & File Management (I/O devices, Disk scheduling, File organization, Directory structures). Case Studies.				

DS2102	Data Structures	TH	-	-
Introduction to Data structures: Abstract Data Types and applications, Time and space requirements of algorithms. Arrays: Representation and implementation, Polynomials, Sparse matrices, String-pattern Matching. Stack and Queues: Representation and implementation, multiple stacks and queues, recursion in stacks. Linked Lists, Representation and implementation, Doubly linked list, Circular linked list. Trees: Binary tree representation, traversals and applications, Threaded binary trees, Binary Search Trees, AVL Trees. Graphs: Graph representations, Graph Traversals: Depth-first search, Breadth-first search, Weighted Graphs. Priority Queues: Heap Structures, Binomial Heaps, Leftist Heaps.				

DS2103	Linear Algebra	TH	-	-
Vector Spaces: Vector spaces and Subspaces, Linear Independence, Basis, and Dimension, Linear transformations, applications. Solving Systems of linear equations: Elementary row operations, Elementary matrices; Matrix algebra, the				

inverse of a matrix, The LU factorization, applications. Determinants: Determinants of a matrix, properties of determinants, Cramer's rule, Eigenvalues and Eigenvectors, Similarity and Diagonalization, applications. Inner Product Spaces: Inner Product, Norm of vector, Inner product spaces, The Gram-Schmidt Process, The QR Factorization Least-Squares Problems, The Singular Value Decomposition, applications.

DS2104	Object Oriented Programming	TH	PRS	-
Fundamentals of Object-Oriented Programming; Classes & Objects. Data Abstraction. Information Hiding & Encapsulation. Methods: Void methods, return methods, argument passing. Inheritance. Polymorphism: Method overloading and method overriding. Abstract Classes. Exception Handling. Files & Database connections.				

DS2105	Capstone Project in Data Science I	-	WS	PR
Capstone project may involve investigation of data engineering tools, installation, and configuration. The students will apply their knowledge on relational data model and management, NoSQL data model and management and data distribution. Moreover, the students will utilize their knowledge on data distribution, data processing techniques such as cleaning, transforming, and enriching data. In addition, students will acquire the skills in using Big data platforms.				

DS2106	Analysis of Algorithms	TH	-	-
Introduction to algorithms. Basic algorithmic analysis. Simple Searching Algorithms. Simple Sorting Algorithms. Recursion. Advanced Searching Algorithms. Advanced Sorting Algorithms. Graph Algorithms -Breadth first search, Depth first search. Dynamic Programming. Greedy algorithms.				

DS2107	System Analysis and Design	TH	-	-
System Analysis Fundamentals: Fundamentals System Analysis and Design (SA&D) concepts, Roles of system analyst, System development life cycle, depicting system graphically, determining feasibility, activity planning and control. Evolution of software development models. Information requirements analysis. Process requirements analysis. The essentials of design. Deployment and maintenance.				

DS2108	Data Pre-Processing	TH	PRS	-
Introduction to Data Preprocessing: What is data preprocessing?, What is dirty data?, Structuring Data, Overview of Data Cleansing. Data Quality: Data Quality, Data Quality Challenges, Raw Files and File Formats, Structured Data, Finding Data Sets, Loading Data into programming language. Summarizing Data with Statistics: Review of Basic Statistics, Summarizing Data. Data Visualization: Introduction to Data Visualization, EDA and CDA, Creating a Histogram, Box Plots, Bar Graphs, Other Graphs.				

DS2109	Communication Skills II	TH	-	-
Writing Memos, Circulars and Notices: What is a Memo?- Principles of précis writing- Approaches to memo writing- Characteristics of a memo- Guidelines for				

writing memos- Language and writing style of a memo- Format of a Memo; Circulars Guidelines for writing a circular- Languages and writing style of a circular- Format of a circular; Notices- Purpose- Format- Important points to remember while writing a notice. Report Writing: Features of Writing a Good Report; Purpose of Report Writing; Difference between Business Report and Engineering Report-Characteristics of writing a good report-Importance of communication in report writing; Guidelines for Report Writing; Steps in Report Writing; Structure of Report; Types of Reports and Different Formats. Writing E-mail: Principles of E-mail; E-mail Etiquette; Overcoming Problems in E-mail Communication. Oral Communication Skills: Oral Business Presentation- Purpose –Audience Locale; Steps in Making a Presentation- Research and planning-Structure and style Preparation –Presentation; Delivering a Presentation. Meetings: Types of Meetings; Importance of Business Meetings; Different Types of Business Meetings; Conducting Meetings-Selecting Participants-Developing Agendas-Opening Meetings-Establishing ground rules for meetings-Time management Evaluations of meeting process-Evaluating the overall meeting-Closing meetings; Common Mistakes Made at Meetings. Reading Skills: Reading Skill; Purpose of Reading; Types of Reading; Techniques for Effective Reading. Employment Communication – Resume: Contents of Good Resume; Guidelines for Writing Resume; Different Types of Resumes; Reason for a Cover Letter to Apply for a Job-Format of Cover Letter; Different Types of Cover Letters. Employment Communication – Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques- Manners and etiquettes to be maintained during an interview; Sample Questions Commonly asked During Interview.

DS-EGP-1201	General English II	TH	-	-
Refer English Curriculum (Page 88 & 89)				

Semester III				
DS3101	Probability Theory	TH	-	-
Introduction to set theory. Introduction to probability, marginal probability, conditional probability. Random variables. Discrete and continuous probability distributions: Discrete Uniform, Bernoulli, Binomial, Poisson, Continuous Uniform, normal, exponential. Introduction to t- distribution, F-distribution and Chi-square distribution.				

DS3102	Regression Analysis	TH	-	-
Simple linear regression model. OLS and ML approaches to estimate the regression parameters. Inference about regression parameters. Model validation. Handling qualitative predictors. Lack-of-fit of the model. Model selection procedures.				

DS3103	Multivariate Calculus	TH	PRS	-
Differential calculus of functions of several variables: Limits and continuity, partial derivatives, the derivative of a multivariable function, chain rule, extrema of multivariable functions, Lagrange multipliers. Integration of functions of several variables: The Jacobian, double and triple integrals, change of variables, spherical and cylindrical coordinate systems. Special functions: Beta, gamma, Bessel,				