### **DSM231 Statistics for Decision-Making**

Semester: III	Course Title: Statistics for Decision-Making	Credit: 4
Course No.: DSM231		(3 T + 1 P)

# Course Outcomes: On successful completion of the course the learner will be able to

	CUGNITIVEADILITIES	COURSEOUTCOMES
		Recall the fundamental concepts and terminology of
CO 1	REMEMBERING	hypothesis testing.
		Understand the various types of statistical tests and their
CO 2	UNDERSTANDING	applications.
		To apply hypothesis testing concepts and apply inferential
CO 3	APPLYING	statistics- t, F, Z Test and Chi-Square Test
		To perform practical application by taking managerial
CO 4	ANALYSING	decisions and evaluating the Concept of Business Analytics.
		Use statistical software or programming language to analyze
CO 5	EVALUATING	the data and generate meaningful insights.
CO 6	CREATING	

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	2	2
CO 2	3	3	2	3	2
CO 3	3	3	2	3	2
<b>CO 4</b>	3	2	3	3	1
CO 5	2	2	2	2	2
CO 6	2	2	2	3	1

Detailed Syllabus	Teaching Hours
Basics of Hypothesis Testing:	15
Population and Sample, Null and Alternative Hypothesis, Types of Errors: Type-I and Type-II Errors. Procedure for Testing of Hypothesis.	
Large Sample Tests of Hypothesis:	
Test for a single mean, Test for the difference between two means, Test for a single proportion, and Test for the difference between two proportions.	
Small Samples Tests of Hypothesis:	15
Test for a single mean, Test for the difference between two means, Test for a single variance, and test for two variances	
	Detailed Syllabus         Basics of Hypothesis Testing:         Population and Sample, Null and Alternative Hypothesis, Types of Errors:         Type-I and Type-II Errors. Procedure for Testing of Hypothesis.         Large Sample Tests of Hypothesis:         Test for a single mean, Test forthe difference between two means, Test for a single proportion, and Test for the differencebetween two proportions.         Small Samples Tests of Hypothesis:         Test for a single mean, Test for the difference between two means, Test for a single variance, and test for two variances

III	Chi-square Tests:	15
	Goodness of Fit Test, Chi-square Test of Independence.	
	Analysis of Variance:	
	One-Way Analysis of Variance, and Two-Way Analysis of Variance.	
IV	Practical Component	15
	<ul> <li>Solving practical problems of all above tests using Excel/R programming</li> </ul>	

#### **Suggested Reference Books:**

- 1. Ken Black Business Statistics, 5th ed., Wiley India
- 2. Anderson, Sweeney, and Williams- Statistics for Business and Economics- Thomson
- 3. Levin and Rubin Statistics for Management, 7th ed., Pearson
- 4. Lind, Marchal, Wathen Statistical techniques in business and economics, 13th ed, McGraw-Hill
- 5. Newbold, Carlson, Thorne Statistics for Business and Economics, 6th ed., Pearson
- 6. S. C.Gupta Fundamentals of Statistics, Himalaya Publishing
- 7. Walpole Probability and Statistics for Scientists and Engineers, 8th ed., Pearson
- 8. Brain S. Everitt and Torsten Hothorn- A Handbook of Statistical Analyses Using R, Chapman& Hall/ CRC.
- 9. Micheal J. Crawley- Statistics An Introduction Using R, John Wiley and Sons, Ltd.
- 10. W.J. DeCoursey- Statistics and Probability for Engineering Applications With MS Excel, Elsevier Science

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## DSM232 Data Structure and Algorithm

Semester: III	Course Title: Data Structure and Algorithm	Credit: 4
Course No.: DSM232		(3 T + 1 P)

## Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVEABILITIES	COURSEOUTCOMES
		Recall the fundamental concepts and terminology of data
CO 1	REMEMBERING	structures.
		Understand the various types of data structures and their
CO 2	UNDERSTANDING	applications.
		Implement linear data structures like arrays, stacks, and
CO 3	APPLYING	queues.
		Analyze and implement non-linear data structures like trees
CO 4	ANALYZING	and graphs.
		Evaluate the performance of different data structures based on
CO 5	EVALUATING	time and space complexity.
		Design algorithms using appropriate data structures to solve
CO 6	CREATING	real-world problems.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	0	2	-	
CO 2	2	1	1	-	
CO 3	3	1	1	-	
<b>CO 4</b>	2	1	-	1	
CO 5	3	1	1	1	
CO 6	3	1	1	-	1

Unit No.	Detailed Syllabus	Teaching
		Hours
I	<ul> <li>Introduction to Data Structures and Linear Data Structures</li> <li>Basic concepts, types of data structures, operations on data structures.</li> <li>Arrays: Definition, types, operations on arrays, multidimensional arrays.</li> <li>Stacks: Definition, operations (push, pop, peek), stack applications (expression evaluation, function calls).</li> <li>Queues: Definition, operations (enqueue, dequeue), circular queue, double-ended queue (Deque).</li> </ul>	15
II	<b>Linked list, Searching and Sorting:</b> Singly Linked Lists: Definition, operations (insertion, deletion, traversal),	15

	applications.					
	Doubly Linked Lists: Definition, operations, comparison with singly linked lists.					
	Circular Linked Lists: Definition, operations. <b>Searching Algorithms</b> : Linear search, binary search, comparison of search algorithms.					
	<b>Sorting Algorithms</b> : Bubble sort, selection sort, insertion sort, merge sort, quick sort					
III	Non-Linear Data Structures	15				
	Trees: Basic definitions, binary trees, binary search trees (BST), tree					
	traversals (in-order, pre-order, post-order).					
	AVL Trees: Balanced trees, rotations, AVL tree properties, insertion, and					
	deletion in AVL trees.					
	Graphs: Definition, representation (adjacency matrix, adjacency list), graph					
	traversal algorithms (BFS, DFS), directed and undirected graphs. Shortest					
	path algorithms (Dijkstra's), minimum spanning tree (Kruskal's and Prim's algorithms).					
IV	Practical Component	15				
	• Programs on implementation of arrays (single and multidimensional).					
	Programs on stack and queue operations.					
	• Programs to convert infix to postfix expression.					
	• Programs on linked list operations (singly, doubly, circular).					
	• Programs on tree traversals and binary search tree operations.					
	• Programs on graph traversal (BFS, DFS).					
	• Programs on sorting and searching algorithms.					

### **Suggested Reference Books:**

- 1. "Data Structures Using C" by Reema Thareja Oxford University Press.
- 2. "Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss Pearson.
- 3. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein *MIT Press*.
- 4. **"Data Structures Through C in Depth"** by S.K. Srivastava and Deepali Srivastava *BPB Publications*.

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## DSM233 Data Visualization and Story Telling

Semester: III	Course Title: Data Visualization and Story Telling	Credit: 4
Course No.: DSM233		(3 T + 1 P)

## Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVEABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Recall the key concepts, tools, and techniques used in data visualization and storytelling in Python.
$CO^{2}$		Understand the importance of visualizing data effectively to communicate insights and the best practices for data
02	UNDERSTAINDING	Apply Python libraries for creating various types of plots and
CO 3	APPLYING	visualizations, including charts, graphs, and interactive visualizations.
CO 4	ANALYZING	Analyze datasets using appropriate visualization techniques and evaluate how visualization techniques influence data interpretation
CO 5	EVALUATING	Evaluate the effectiveness of different types of visualizations for telling a compelling data-driven story.
CO 6	CREATING	Design and create interactive, informative, and aesthetically appealing data visualizations and stories using Python tools and libraries.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO 1</b>	3	0	2	-	-
CO 2	2	1	1	-	-
<b>CO 3</b>	3	1	1	-	-
<b>CO 4</b>	2	1	-	1	-
<b>CO 5</b>	3	1	1	1	-
<b>CO 6</b>	3	1	1	-	1

Unit No.	Detailed Syllabus	Teaching Hours
Ι	<ul> <li>Introduction to Data Visualization</li> <li>Overview of Data Visualization: Importance, Use Cases, and Applications</li> <li>Introduction to Python Visualization Libraries: Matplotlib, Seaborn, Plotly, and Bokeh</li> <li>Basic Plotting with Matplotlib: Line Plots, Scatter Plots, Bar Charts, Histograms</li> </ul>	15

	• Customizing Plots: Titles, Labels, Legends, Colors, Styles, and Grids			
II	Advanced Visualization Techniques and Interactive Dashboards			
	<ul> <li>Advanced Plots: Heatmaps, Pair Plots, Box Plots, Violin Plots, KDE (Kernel Density Estimation) Plots</li> <li>Interactive Visualizations: Plotly and Bokeh for Dashboards and Interactive Plots</li> <li>Customizing Interactive Dashboards: Adding Hover Effects, Legends, and Filtering</li> <li>Data Aggregation and Grouping for Visualization</li> <li>Data Preprocessing: Handling Missing Data, Cleaning, and Transforming Data for Visualization</li> </ul>			
III	Storytelling in Data Science	15		
	<ul> <li>Introduction to Storytelling: Why Storytelling Matters in Data Science, The Science of Storytelling Visual Storytelling Techniques: Types and Benefits, Common Pitfalls in Traditional Presentations</li> <li>Understanding Data Storytelling Frameworks: Author-driven vs. Reader-driven Narratives</li> <li>Story Structures in Data Science: Linear, Circular, Problem-Solution, Compare-Contrast, Cause- and-Effect, Before-and-After, Data-Driven Insights</li> <li>Designing Data Stories: Structuring the Narrative and Highlighting Key Insights</li> </ul>			
	Using Annotations and Text: Adding Context and Emphasis to Visualizations			
	<ul> <li>Visualizations</li> <li>Case Studies: Real-World Examples of Data Stories in Rusiness</li> </ul>			
IV	Practical Component and Final Project	15		
	<ul> <li>Hands-on Practice: Creating Line Plots, Bar Charts, Pie Charts, and Advanced Visualizations</li> <li>Building Interactive Dashboards and Visualizations</li> <li>Data Cleaning and Wrangling for Effective Storytelling</li> <li>Designing a Compelling Data Story: Visualizing and Presenting Insights</li> <li>Final Project: Creating an Interactive Data Visualization Dashboard with Python and Storytelling Elements</li> </ul>			

### **Suggested Reference Books:**

- 1. "Python Data Science Handbook" by Jake VanderPlas O'Reilly Media
- 2. "Data Visualization with Python and JavaScript" by Kyran Dale O'Reilly Media
- 3. **"Interactive Data Visualization with Python"** by Abhishek Kumar, Pradeep Gohil Packt Publishing

- 4. "Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic Wiley
- 5. "Presentation Zen: Simple Ideas on Presentation Design and Delivery" by Garr Reynolds – New Riders
- 6. "Resonate: Present Visual Stories that Transform Audiences" by Nancy Duarte Wiley

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