



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications /
Bachelor of Computer Applications (Honours/Honours with Research) /
Master of Computer Applications (Integrated)

Level: UG

Course / Subject Code: BC05001041

Course / Subject Name : Data Visualization

w. e. f. Academic Year:	2026-27
Semester:	5
Category of the Course:	Discipline-Specific Elective-2

Prerequisite:	None
Rationale:	Data visualization is important in the age of big data, where vast amounts of information need to be analyzed and presented in a way so that patterns and trends can be identified and the process of decision-making becomes faster and smarter. This course helps students in understanding data and visualizing them as per data type.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Explain importance of visualization and design principles	U
02	Visualize structured and unstructured data	A
03	Use storytelling framework and illustrate importance of storytelling	A
04	Describe what makes a visualization misleading	U

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	2	5	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to visualization Data visualization need and how to do. Seven stages of visualizing	11	10



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	data, usage of visualization, types of charts, common chart selection basics Visualization best practices Importance of Data visualization, Data types, Effectiveness of visual encoding, Estimation, Edward Tufte's Design principles, Chart types - Comparing categories – Bar charts, paired bar, sstacked bar, diverging bar, Dot plot, Marimekko and mosaic charts, Unit-isotype and Waffle charts, Heat map, Gauge and bullet chart, sankey diagram, Waterfall chart Time – Line, circular line, slope, spark line, bump chart, cycle chart, area chart, stacked area chart, steamgraph, horizon chart, Gantt chart, flow charts Distribution – Histogram, pyramid, visualizing statistical uncertainty with charts, Box and whisker plot, candlestick chart, violine chart, Ridgeline plot, visualizing uncertainty by showing the data, stem and leaf plot Geospatial – choropleth map, cartogram, flowmap Relationship – scatterplot, Radar charts, chord diagram, Arc chart, correlation matrix, Network diagrams, tree diagrams		
2.	Visualization of structured data Exploratory analysis – Univariate analysis and Multivariate analysis Data Collection - Data sets(Based on source and availability, based on data type, based on domain, Data formats, Data Parsing, Data Transformation Data cleaning – Data consistency, Heterogeneous data, Missing data, Data transformation, Data Segmentation	13	30
3.	Visualization of unstructured data Importance of Text data visualization, challenges of text data visualization, various forms of text data, text data preprocessing pipeline	12	30



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	visualizing text data – word cloud, bar chart, word tree, line chart, joint plot, histogram plot, scattertext visualization visualizing conversations – visualizing timeline, visualizing people, visualizing information flow, visualizing data hierarchy, visualizing network, visualizing content		
4.	Visual storytelling Importance of storytelling, science behind storytelling, Presentation types, death by presentation storytelling framework – importance of business storytelling, storytelling frameworks, data storytelling, narrative types, dimensions of narrative storytelling, data story types, Analytics dashboard	13	20
5.	Misleading with charts – Preattentive processing of visual attributes, Types of misleading charts – visualization for decoration, Axis manipulation, cherry picking data, Pie chart blunders, Misuse of correlation and causation,	11	10
Total		60	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	60	30	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Data Visualization: Storytelling Using Data by Sharada Sringswara; Purvi Tiwari; U. Dinesh Kumar, Wiley publication
2. Data Preparation and Analysis: An easy approach to master data science by Dr. Pooja Sharma BPB publication
3. Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures 1st Edition by Claus O. Wilke, O'reilly publication



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4. Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks by Jonathan Schwabish, Columbia university press

(b) Open source software and website:

1. A Comprehensive Guide On Data Visualization In Python - <https://www.analyticsvidhya.com/blog/2021/10/a-comprehensive-guide-on-data-visualization-in-python/>
2. <https://www.tableau.com/>
3. Chart.js is an open-source library for designers and developers create charts using JavaScript

Suggested Project List:

1. Import the WhatsApp chat and do the visualization - (i) time analysis – at what time most chat occurs (ii) word count and length of words (iii) the age group analysis for frequent chat sessions. Add more insights.
2. Prepare the data visualization for Olympic Games medal winning and participating sports person. Show individual sport wise analysis. Add more insights.

Suggested Activities for Students:

1. Real world case studies-based learning – How companies visualize data in their annual report.
2. Problem solving/Coding – visualize university/college data – geographical diversity, gender ratio, subject wise merit, branch wise merit

CO- PO Mapping:

Semester _5	Course Name : Data Visualization										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2		2		3		1	2	1		2
CO2	2	2	2	2	3		1	2	1		2
CO3	2	2	2	2	3		1	2	1		2
CO4	2		2		3	2	1	2	1		2

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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