

**Year: B. Tech III (Semester VI)**

**Subject Name:** Data Visualization and Dashboards

**Subject Code:** BTCO14610

**Type of course:** Professional Elective II and III

**Prerequisite (if any):** HTML, Javascript, CSS knowledge is required

**List of Courses where this course will be prerequisite :-**

**Rationale:** (should also include Description of the relevance of this course in the Program)

**Teaching and Examination Scheme:**

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

**Content:**

Sr. No.	Content	Total Hrs
1	<b>Introduction to Data Visualization:</b> Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Key factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar) Making use of HTML5 CANVAS, Integrating SVG	3
2	<b>HTML5 CANVAS :</b> Canvas: Basic usage, Drawing shapes, Applying styles and colors, Drawing text, Using images, Gradients, Basic animations, Game examples with Canvas	6
3	<b>SVG :</b> SVG Introduction, SVG in HTML, SVG Rectangle, SVG Circle, SVG Ellipse, SVG Line, SVG Polygon, SVG Polyline, SVG Path, SVG Text, SVG Stroking, SVG Filters Intro, SVG Blur Effects, SVG Drop Shadows, SVG Linear, SVG Radial, SVG Examples	6
4	<b>Integrating External Data and Google Charts:</b> Tables: Reading Data from Standard text files ( .txt, .csv, XML), Displaying JSON content. Google Charts: Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations). Google Maps.	6
5	<b>Canvas.JS:</b> Introduction, Chart Elements, Working with data, Chart Types, Chart Options, Methods and properties: Chart Title, Subtitle, Legend, Tool tip, Axis, StripLines, Data Series, Zooming and Panning	5

6.	<b>D3.Js</b> : Getting setup with D3. Making selections, changing selection's attribute.Loading and filtering External data : Building a graphic that uses all of the population distribution data, Data formats you can use with D3, Creating a server to upload your data, D3's function for loading data, Dealing with Asynchronous requests, Loading and formatting Large Data Sets Advanced Data Visualization:Making charts interactive and Animated:Data joins, updates and exits, interactive buttons, Updating charts. Adding transactions, using keys Adding a Play Button:wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence	10
7.	<b>Tableau</b> : Getting to Know Tableau for Data Visualization, Tableau Data Sources, Tableau Worksheets, Tableau Calculations, Tableau Sort & Filters, Tableau Charts, Dashboard and Storytelling with Data. Tell the Story of Your Data	6
8.	<b>Information Dashboard Design</b> : Introduction, Dashboard design issues and assessment of needs, Considerations for designing dashboard-visual perception. Achieving eloquence, Designing Bullet Graphs, Designing Sparklines, Critical Design Practices, Dashboard example with Google API, Dashboard example with D3.	3

**Suggested Specification table with Marks (Theory): (For B.Tech only)**

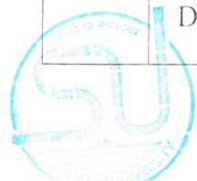
Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	20	10	5	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Books:**

Sr No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication / Publication Edition
1	JavaScript and jQuery for Data Analysis and Visualization	Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery	WROX	Latest Edition
2	Visual storytelling with D3	Ritchie S. King	Pearson	



3	Visualizing data: Exploring and explaining data with the processing environment	Ben Fry	O'Reilly	
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**Course Outcomes:**

Sr. No.	CO statement	Marks % weightage
CO-1	Explain principles of visual perception.	20%
CO-2	Apply core skills for visual analysis.	35%
CO-3	Apply visualization techniques for various data analysis tasks.	30%
CO-4	Design information dashboard.	15%

**List of Open learning website:**

<https://www.coursera.org/learn/analytics-tableau/home/welcome>  
<https://www.coursera.org/learn/datavisualization>

**List of Open Source Software:**

- D3. Js.
- Tableau
- Plotly.
- ggPlot2.
- RawGraphs.
- Leaflet.
- PowerMap.
- OpenLayers.
- Gephi.

**FOR LAB SESSIONS:**

**List of Experiments:**

Sr. No.	Practical
1	Implement basic and advanced graphical shapes using HTML5 Canvas tag
2	Implement basic and advanced graphical shapes using HTML5 SVG tag
3	Develop Following Program Using HTML5 and JavaScript a. Develop the simple bar chart using TML5 CANVAS b. Read the data .txt file and draw Data Table c. Read the data .txt file and draw Simple Bar Chart d. Read the data .csv file and draw Data Table





	<ul style="list-style-type: none"> <li>e. Read the data .csv file and draw Column Bar Chart</li> <li>f. Read the data XML file and draw Data Table</li> <li>g. Read the data XML file and draw Simple Bar Chart</li> <li>h. Read JSON Data and draw Data Table</li> <li>i. Read JSON Data and draw Simple Chart</li> </ul>
4	Develop different charts like Bar Chart, Line Chart, Pie Chart, Column Chart, Doughnut chart with CanvasJS
5	Develop different charts like Bar Chart, Line Chart, Pie Chart, Column Chart with D3.JS
6	Develop different charts like Bar Chart, Line Chart, Pie Chart, Gantt Chart , Scatter Plot with Tableau
7	Develop different charts with Google Chart and demonstrate Google Maps <ul style="list-style-type: none"> <li>a. Using Google Charts API Basics draw charts like a Bar chart</li> <li>b. Using Google Charts API Basics draw charts like a Line chart</li> <li>c. Using Google Charts API Basics, draw PieChart.</li> <li>d. Using Google Charts API Basics, draw Donut Chart.</li> <li>e. Using Google Charts API Basics draw Candle Chart.</li> <li>f. Using Google API read JSON file and create Google Map.</li> </ul>
8	Implement simple Dashboard

Major Equipment Needed: -

