



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari College of Computer Application
Semester-7 (BCA)

Subject: Data Visualization & Business Intelligence – BCADS10401

Type of course: Major Core

Prerequisite: Basic knowledge of Data Visualization and Business Intelligence & its tools. Students should also possess analytical, problem-solving, and data interpretation skills to analyze datasets, create visual dashboards, and generate business insights using data visualization tools such as Microsoft Power BI.

Rationale:

This course equips students with the skills to understand data and generate insights from it by visualising it using a range of data visualization tools available. To understand a large volume of data, discover trends, communicate effectively with all stakeholders and influence decisions. To develop a Business Analytics skillset about how to create effective charts and interactive dashboards is extremely useful.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	SEE		CCE		
			Theory		Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.



Course Content:

Sr. No	Course content	Hrs	% Weightage
1	Introduction to Data Visualization : Introduction of Data Visualization, Definition of Data Visualization, Importance of Data Visualization, History and Evolution of Data Visualization, Tools of Data Visualization, Role of Data Visualization in Business Intelligence, Role of Data Visualization in Decision Making, Common Mistakes in Data Visualization, Datatypes used in visualization (Quantitative, Qualitative, Temporal, Spatial)	09	20%
2	Introduction to Business Intelligence : Introduction of Business Intelligence, Definition of BI, History of BI, Evolution of BI, Role of BI in Organization, Elements of BI, Benefits of BI, Limitations of BI, Real Time BI, Architecture of BI, Types of Business Intelligence, Components of BI systems, BI VS Business Analytics, BI Vs Data Science, BI Vs Traditional Reporting, Key Performance Indicators (KPIs) in BI, BI in different industries(Healthcare, Retail, Finance, Education)	09	20%
3	Data Visualization Principles : Importance of Data Visualization in Business Decisions, Principles of Effective Visualization, Types of Charts: Categorical- Bar, Column, Pie ; Temporal- Line, Area; Hierarchical- Tree-map, Sunburst; Relational- Scatter, Bubble; Spatial- Map Visualizations, Advanced Visualizations: Waterfall, Box Plot, Radar Chart, Funnel, Heatmap, Choosing the Right Chart Building Visual Narratives, Dashboards: KPIs and Metrics, Layout & Design Principles Filters, Slicers, Drill-downs	10	20%
4	Power BI : Introduction to Power BI, Advantages of Power BI, Disadvantages / Limitations of Power BI, Power BI Architecture, Components of Power BI (Power BI Desktop, Service, Mobile, Gateway, Embedded), Power BI vs. Excel — Key Differences, Data Access in Power BI, Visualization Techniques for spatial data, Geospatial data, Time-Oriented Data, Multivariate Data, Trees, Graphs, Networks, Text and Document Visualization, Creating Reports in Power BI Desktop, Future Trends in Power BI (AI Visuals, Copilot in Power BI)	9	20%



5	Advanced BI, Emerging Trends & Ethics : Introduction to Data Warehouse, Data Warehouse vs. Database, ETL Process (Extract, Transform, Load), OLAP vs. OLTP, Introduction to Data Analytics. Types of Analytics (Descriptive, Diagnostic, Predictive, Prescriptive), Introduction to Data Mining, Role of Artificial Intelligence in BI, Big Data and its Role in BI, Data Privacy and Security in BI, Ethical Issues in Data Visualization and BI	08	20%
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Continuous Assessment: -

Sr. No	Active Learning Activities	Marks
1	PowerBI Interface Exploration Students will download and install Power BI Desktop tool. Open the built in sample report in Power BI and explore the interface. Students should identify different parts of the interface, such as Report View, Data View, Model View, Visualizations pane, Fields pane, Filters pane, Canvas, and Slicers. Take screenshots of each part and add a short description explaining it. Finally, upload all screenshots with descriptions as a PDF on the GMIU web portal.	10
2	Chart Type Identification Students will collect 5 charts from newspapers, magazines, or websites (such as <i>Times of India</i> or <i>Economic Survey of India</i> etc). For each chart, note down : chart type, what data it shows, why that chart type was chosen, and one thing they would improve in one PDF. Upload PDF in GMIU web Portal.	10
3	Build a Dashboard Collect marks of 50 students in 5 subjects and create a simple dashboard using MS Excel, Power BI, or Google Sheets. Make a bar chart for average marks of each subject, a pie chart for grade distribution (A, B, C, D, F), and a line chart for top 5 students' performance. Give proper titles, use similar colours, and arrange everything neatly on a sheet named " Dashboard ". Add a short explanation for each chart, and submit everything as a PDF on the GMIU web portal.	10
4	Skill-Building Task Students will define and create a mini project using the Power BI tool. The project report must be in PDF format and upload it on the GMIU web portal. (Group of 4 students)	10
5	Selective Response Students will be assigned a selective response based test on GMIU web Portal.	10
Total		50

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	25%	45%	15%	15%	0	0

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.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand and describe the main concepts of data visualization.
CO2	Determine the right type of graph for different types of data available or provided through hands-on experience with handling real data sets.
CO3	Read reports, charts, graphs, figures, maps and derive meaning from them.
CO4	Create reports, data visualizations, and dashboards using tools.
CO5	Understand how to automate tasks, create data models, and present insights using data visualization and dashboards.

List of Practical

Sr. No	Descriptions	Unit No.	Hrs
1	Basic introduction to various Data Visualization tools like Microsoft Excel, Tableau, PowerBI.	3	2
2	Introduction and Installation of PowerBI.	4	2
3	Import data from CSV/Excel into Microsoft Power BI and perform data cleaning (remove duplicates, handle missing values).	4	2
4	Split columns, merge queries, and create relationships between multiple tables.	4	2
5	Create measures for sales analysis (Total Sales, Profit, Average Order Value).	4	2



6	Build visuals : Bar Chart, Line Chart, and Pie Chart for sales trends.	4	2
7	Create a Map visualization for regional sales distribution.	4	2
8	Add slicers and filters to enhance interactivity.	4	2
9	Design a dashboard combining multiple visuals (charts, maps)	4	2
10	Use DAX to create calculated columns (e.g., Customer Segmentation: High/Medium/Low value).	4	2
11	Implement Time Intelligence DAX functions (YoY growth, MTD, QTD).	4	2
12	Apply conditional formatting, themes, and company branding in dashboards.	4	2
13	Apply Grouping and Binning in Power BI to categorize products and segment customers by sales ranges.	4	2
14	Connect Power BI to SQL Database and merge with Excel/CSV data.	4	2
15	Create calculated tables and apply advanced DAX filtering techniques for analytical insights.	4	2
Total			30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

- [1] Microsoft Power BI Data Analyst Certification Guide: A Complete Reference Guide to Becoming a Microsoft-Certified Data Analyst (2022), Chris Freeman, Packt Publishing
- [2] Business Intelligence Guidebook: From Data Integration to Analytics (2014), Rick Sherman, Morgan Kaufmann
- [3] Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures (2019), Claus O. Wilke, O'Reilly Media
- [4] The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios (2017), Steve Wexler, Jeffrey Shaffer, Andy Cotgreave, Wiley
- [5] Hands-On Business Intelligence with Qlik Sense: Implement BI and analytics solutions with a user-friendly platform (2019), Pablo Labbe, Packt Publishing

