



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Master of Business Administration**

**Level: PG**

**Branch: Branch: Information Technology**

**Course / Subject Code: MB03096051**

**Course / Subject Name : Advanced Analytics**

w. e. f. Academic Year:	2025-2026
Semester:	3
Category of the Course:	MDC/Elective

<b>Prerequisite:</b>	Any Graduate
<b>Rationale:</b>	In the modern business environment, data is the new capital. Organizations thrive on insights derived from structured and unstructured data, which drive strategic decisions. The ability to analyze, manipulate, visualize, and interpret data is a core competency for any MBA graduate specializing in Information Technology. This course cluster equips students with practical, in-demand analytics skills that bridge business acumen with technical capability.

**Course Outcome:**

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply Excel functions and tools to perform business data analysis	Understand
02	Apply SQL queries to acquire and manage data from relational databases	Understand
03	Apply Tableau tools to create visual dashboards that communicate business insights	Apply
04	Apply Python programming to clean and structure data for analysis, statistical techniques in Python to analyze and interpret business data	Apply
05	Apply integrated tools (Excel, SQL, Tableau, Python) to solve a business analytics problem	Understand

*\*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)	
3	0	0	3	70	30	50	0	150



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## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Unit Title: Business Analytics with Excel</b> <ul style="list-style-type: none"><li>• Introduction to Business Analytics: Definition and scope of business analytics, Types of analytics: Descriptive, Predictive, and Prescriptive, Role and applications of Excel in business analytics</li><li>• Data Management in Excel: Importing, cleaning, and preparing data for analysis, Sorting, filtering, and using conditional formatting</li><li>• Excel lookup functions: VLOOKUP, HLOOKUP, INDEX-MATCH</li><li>• Descriptive Statistics Using Excel: Mean, Median, Mode</li><li>• Dispersion: Range, Variance, Standard Deviation</li><li>• Frequency distribution and histograms</li></ul>	13	25
2.	<b>Unit Title: Data Visualization and Sentiment Analytics with Excel</b> <ul style="list-style-type: none"><li>• Data Visualization &amp; Dashboards: Creating bar, line, pie, and scatter charts, Pivot Tables and Pivot Charts</li><li>• Decision Modeling with Excel: What-if analysis: Scenario Manager, Goal Seek, Data Tables</li><li>• Data Preparation with Excel: Importing textual data (CSV, Google Forms, etc.), Cleaning text using functions: LOWER(), TRIM(), SUBSTITUTE()</li><li>• Sentiment Lexicon: Creating lists of positive and negative words, Introduction to word matching using SEARCH(), COUNTIF()</li><li>• Data Scrapping: Web scraping, Legal and ethical considerations, Use cases: product pricing, weather, stock data, etc.</li></ul>	10	25
3.	<b>Unit Title: Data Visualization using Tableau</b> <ul style="list-style-type: none"><li>• Introduction to Data Visualization &amp; Tableau: Importance of data visualization in business analytics, Tableau interface, data connection, and workspace overview, Understanding data types and roles in Tableau</li><li>• Data Preparation and Organization: Connecting to various data sources (Excel, CSV, databases), Data blending, and joining in Tableau</li></ul> <p>Pivoting and data reshaping, Handling nulls, and filtering data</p> <ul style="list-style-type: none"><li>• Creating Basic Visualizations: Bar charts, Line charts, Pie charts, Scatter plots, Maps, and Geographic visualization, Using Marks, Colors, Size, Labels, and Tooltips</li></ul>	12	25



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	<ul style="list-style-type: none"> <li>Intermediate Visualization Techniques: Highlight tables, heat maps, treemaps, Gantt charts, and bullet graphs</li> </ul>		
4.	<p><b>Unit Title: Data Analytics with Python</b></p> <ul style="list-style-type: none"> <li>Introduction to Python for Analytics: Python installation via Anaconda &amp; Jupyter Notebook, Python syntax: variables, data types, control flow (if, for, while), Functions and basic file operations</li> <li>Data Structures in Python: Lists, Tuples, Dictionaries, Sets – operations and use cases, Introduction to NumPy arrays and array operations</li> <li>Working with Pandas: Creating and manipulating Series and Data Frames, Importing data (CSV, Excel, Web, APIs), Data cleaning: handling nulls, duplicates, and type conversions, Filtering, sorting, grouping, merging datasets</li> <li>Exploratory Data Analysis (EDA): Descriptive statistics: mean, median, mode, standard deviation, Data visualization with Matplotlib &amp; Seaborn (histograms, boxplots, scatterplots)</li> <li>Statistical Analysis with Python: Probability distributions (normal, binomial, Poisson) using SciPy</li> <li>Time Series and Forecasting (Basics): Time series structure and visualization, Moving averages and basic forecasting techniques, Introduction to time series decomposition</li> </ul>	10	25
5	<p>Excel: Apply VLOOKUP, HLOOKUP, and INDEX-MATCH to extract relevant data from large datasets, Use Pivot Tables and Charts to create interactive dashboards for business data analysis, Implement What-if Analysis tools like Goal Seek and Scenario Manager to evaluate decision-making scenarios, Compute mean, median, and standard deviation to analyze data trends and variability.</p> <p>Tableau: Construct bar, line, and pie charts to visualize sales or marketing trends. Integrate data from different sources to build comprehensive visual dashboards for business intelligence.</p> <p>Python: Write scripts using loops and functions to automate data processing tasks, Utilize Pandas to clean datasets and perform exploratory data analysis (EDA), Apply probability distribution simulations to model real-world scenarios or forecast outcomes.</p>	--	--
<b>Total</b>		<b>45</b>	<b>100</b>

**Suggested Specification Table with Marks (Theory):**



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Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10%	20%	25%	20%	15%	10%

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:

#### Primary Reference:

1. Wayne L. Winston, Data Analysis and Business Modeling with Excel, Microsoft Press.
2. Ben Forta, SQL in 10 Minutes, Sams Teach Yourself, Sams Publishing.
3. Molly Monsey & Paul Sochan, Tableau for Dummies, Wiley
4. Wes McKinney, Python for Data Analysis, O'Reilly
5. Allen B. Downey, Think Stats, O'Reilly
6. Jake VanderPlas, Python Data Science Handbook

#### Supplementary Texts:

7. S. Christian Albright & Wayne L. Winston, Business Analytics: Data Analysis & Decision Making, Cengage Learning.
8. Thomas J. Quirk, Excel 2021 for Business Statistics: A Guide to Solving Practical Problems, Springer.
9. Microsoft Excel official tutorials: <https://support.microsoft.com/excel>
10. Alan Beaulieu, *Learning SQL*, O'Reilly Media
11. **Practical SQL: A Beginner's Guide to Storytelling with Data** by Anthony DeBarros, No Starch Press
12. Online SQL Playground: <https://sqlbolt.com/> or <https://www.w3schools.com/sql/>
13. Joshua N. Milligan, Learning Tableau, Packt Publishing
14. Tableau Official Tutorials: <https://www.tableau.com/learn/training>
15. Tableau Public Gallery for sample dashboards: <https://public.tableau.com>
16. <https://pandas.pydata.org/>
17. <https://seaborn.pydata.org/>
18. <https://scikit-learn.org/>

### (b) Open source software and website:

1. MySQL Community Edition: <https://www.mysql.com/products/community/>
2. Tableau Public (Free Version): <https://public.tableau.com/>
3. Jupyter Notebook: <https://jupyter.org/>
4. Anaconda: <https://www.anaconda.com/products/individual>

## Suggested Project List:

### 1. Business Analytics with Excel

#### Project 1: Sales Performance Analysis



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**Objective:** Analyze a company's sales data over a year using Excel.

**Tasks:** Clean and format the dataset for analysis, Use pivot tables to summarize sales by product, region, and salesperson, Create charts (line, bar, pie) to visualize sales trends.

Perform descriptive statistics (mean, median, mode) on sales data, Conduct a what-if analysis using Goal Seek and Scenario Manager to forecast sales based on varying scenarios.

**Outcome:** A comprehensive sales performance report, with clear visualizations and actionable insights for management.

## **Project 2: Financial Data Analysis**

**Objective:** Analyze financial performance metrics of a company using Excel.

**Tasks:** Calculate financial ratios (e.g., ROI, ROE, liquidity ratios) using Excel functions.

Prepare a dashboard with key financial metrics (like cash flow, profits, and operating costs).

Use conditional formatting to highlight important financial trends. Apply descriptive statistics to key financial data for insights.

**Outcome:** A detailed financial performance analysis with visuals that guide business decision-making.

## **2. Data Acquisition and Manipulation using SQL**

### **Project 3: Customer Data Management System**

**Objective:** Create and manage a customer database for an e-commerce platform.

**Tasks:** Design and create SQL tables for customers, orders, and products.

Write SQL queries to extract customer purchase behavior (e.g., total spend per customer).

Implement joins to retrieve data across multiple tables (customer information, order history).

Use subqueries to filter data (e.g., find customers who made purchases in the last month).

**Outcome:** A database-backed analysis showing key customer insights, including frequent shoppers, high-value customers, and purchasing patterns.

### **Project 4: Employee Performance Tracking Database**

**Objective:** Build a relational database to track employee performance over the year.

**Tasks:** Create tables for employees, departments, and performance reviews.

Write SQL queries to calculate average performance scores, track improvement over time, and identify top performers. Use GROUP BY and HAVING clauses to filter results based on performance criteria.

Implement a nested query to find employees who need performance improvement.

**Outcome:** A detailed employee performance report based on key performance indicators (KPIs).



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### 3. Data Visualization using Tableau

#### Project 5: Regional Sales Performance Dashboard

Objective: Develop a Tableau dashboard to visualize regional sales performance.

Tasks: Connect Tableau to a sales dataset (CSV, Excel, or database).

Create various visualizations (bar charts, heatmaps, scatter plots) for sales across regions and time periods. Build an interactive dashboard with filters (e.g., product categories, sales regions).

Add tooltips and highlight actions to provide more detailed insights.

Outcome: An interactive Tableau dashboard that allows stakeholders to monitor sales performance at both regional and national levels.

#### Project 6: Customer Segmentation Dashboard

Objective: Build a Tableau dashboard to perform customer segmentation based on purchase behavior.

Tasks: Import and clean the customer dataset in Tableau.

Create visualizations that show customer distribution by demographics, spending habits, and product categories. Segment customers into groups (e.g., high, medium, low spenders) using grouping and clustering. Develop an interactive dashboard with drill-down capabilities.

Outcome: A segmented customer dashboard to help marketers target specific groups for promotions or product offerings.

#### CO- PO Mapping:

Semester 3	Course Name : Advanced Analytics				
	POs				
Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	3	3	2	2	3
CO3	2	2	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

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

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