FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Artificial Intelligence (AI) and Data Science)**

Semester: **VII**

Course Code: **202046719**

Course Title: **Business Analytics and Visualization**

Course Group: **Professional Core Course**

Course Objectives: Data Analytics involves data discovery that helps in making smart decisions, creating suggestions for options based on previous choices. Data visualization sees the pattern in data and also sees the pattern when data is not part of pattern.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 09	25 / 09	150 / 53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Business Analytics:** Why Analytics, Business Analytics: The Science of Data-Driven Decision Making, Descriptive Analytics Predictive Analytics Prescriptive Analytics Descriptive, Predictive and Prescriptive Analytics Techniques Big Data Analytics Web and Social Media Analytics Machine Learning Algorithms Framework for Data-Driven Decision Making Analytics Capability Building Roadmap for Analytics Capability Building Challenges in Data-Driven Decision Making and Future	07
2	**Sampling and Estimation:** Introduction to Sampling, Population Parameters and Sample Statistic, Sampling, Probabilistic Sampling, Non-Probability Sampling, Sampling Distribution, Central Limit Theorem (CLT), Sample Size Estimation for Mean of the Population, Estimation of Population Parameters, Method of Moments, Estimation of Parameters Using Method of Moments, Estimation of Parameters Using Maximum Likelihood Estimation.	07

3	**Hypothesis Testing:** Introduction to Hypothesis Testing, Setting Up a Hypothesis Test, One-Tailed and Two-tailed Test, Type I Error, Type II Error, and Power of The Hypothesis Test, Hypothesis Testing for Population mean with Known Variance: Z-Test, Hypothesis Test for Population mean under Unknown Population Variance, Paired Sample t-Test, Effect Size: Cohen's D	**07**
4	**Analysis of Variance:** Introduction to Analysis of Variance (ANOVA), Multiple t-Tests for Comparing Several Means, One-way Analysis of Variance (ANOVA), Two-Way Analysis of Variance (ANOVA)	**04**
5	**Data Visualization:** Principles of Data Visualization, Design Data visualization: The big three, Designing to meet the needs, Picking the most appropriate Design style, Choosing how to add context, Selecting the appropriate Data Graphic Type, Choosing a Data Graphic.	**07**
6	**Advanced Topics:** Introduction to Multiple Linear Regression, Introduction to Forecasting Techniques, Introduction to Six Sigma	**05**
7	**Case study:** Marketing, Healthcare, Airline Industry, etc.	**03**
	Total	**40**

List of Practicals / Tutorials:

1	Take student data with Enrollment number, name, gender, semester wise, subject wise marks, address with geographical location and other necessary data and perform following analytics and visualization.(Practical 1 to 4)
2	Find the average marks of the student in one semester and across all semesters.
3	Find gender wise average marks in all semesters.
4	Classify the students with average, good and excellent on the basis of marks.
5	Consider the sample of 50 students. Gather the university exam score of the students across all semesters of Engineering for one college. Write a program to find out mean and standard deviation for this college. Now consider the sample of students of different colleges of Gujarat for university exam score.
6	Write a program to find out mean and standard deviation. Write the observations. (Prefer Practical 5 data set)
7	Collect the month wise COVID cases data for cities – Ahmedabad, Vadodara, Rajkot, Surat. Plot this time series Data. Analyze the trend as per time.
8	There is a need to advice the 12th standard students that which college he/she should choose for engineering education. Decide the features to use for grading the engineering college. Prepare the data set.
9	Write a program to apply random forest algorithm and suggest the best suited college for 12th standard students. (Prefer Practical 7 data set)
10	Study the various graph for data visualization.
11	Case study on Testing Marketing Hypothesis.

Reference Books:

1	Business Analytics: The science of Data Driven Decision Making by u Dinesh Kumar, Willey
2	Essential of Business Analytics by by Jeffrey D. Camm, James J. Cochran, Michael J. Fry, Jeffrey W. Ohlman, David R. Anderson
3	Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press
4	Doing Data Science by Cathy O'Neil, Rachel Schutt , O'Reilly Media, Inc

Supplementary learning Material:

1	Lecture Note
2	NPTEL
3	https://www.analyticsvidhya.com/
4	Coursera

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
15%	40%	30%	10%	5%	---	

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 Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Identify the data types, the relationship between data, and processing method for data.	**20**
CO-2	To be able to apply the concept of probability, sampling, distribution, and estimation in solving real time problems.	**25**
CO-3	Apply appropriate data visualization techniques on multiple data files and draw different charts.	**25**
CO-4	Identify the data types, the relationship between data, and the visualization techniques for data.	**30**

Curriculum Revision:	
Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2026