

TM104: Quantitative Techniques & Business Analytics

Course Information

Particular	Details
Course Code	TM104
Course Title	Quantitative Techniques & Business Analytics
Programme	MBA (Technology Management)
Category	Foundation/Core
Credits	4
L-T-P	3-1-0
Contact Hours	60
Semester	I
Prerequisite	Basic Mathematics and Statistics

Course Description

This course introduces quantitative techniques and business analytics for managerial decision-making in technology-driven organizations. It covers statistical methods, optimization techniques, forecasting, probability, regression analysis, decision theory, and data-driven business analytics using spreadsheet tools and visualization techniques.

Course Objectives

Upon successful completion of this course, students will be able to:

1. Understand quantitative techniques used in business decision-making.
2. Apply statistical methods and optimization models to managerial problems.
3. Analyse business data using analytical tools and visualization techniques.
4. Develop forecasting and predictive models for technology-based organizations.
5. Make evidence-based managerial decisions using business analytics.

Course Outcomes (COs)

After successful completion of the course, students will be able to:

CO	Course Outcome	Bloom's Level
C01	Explain the concepts and applications of quantitative techniques and business analytics in managerial decision-making.	K2 (Understand)
C02	Apply descriptive statistics, probability, and optimization techniques to solve business problems.	K3 (Apply)
C03	Analyse business data using regression, correlation, forecasting, and hypothesis testing methods.	K4 (Analyse)
C04	Evaluate business alternatives using decision theory, linear programming, and risk analysis techniques.	K5 (Evaluate)
C05	Utilize business analytics tools for data visualization, predictive analytics, and performance improvement.	K5 (Evaluate)
C06	Develop analytical models and data-driven solutions for strategic managerial decision-making in technology organizations.	K6 (Create)

Course Contents

Unit I: Introduction to Quantitative Techniques

Role of Quantitative Techniques in Management, Types of Business Data, Data Collection Methods, Sampling Techniques, Data Classification and Tabulation, Measures of Central Tendency, Measures of Dispersion, Skewness and Kurtosis, Data Visualization

Tutorials: Data Analysis using MS Excel, Descriptive Statistics Exercises

Unit II: Probability and Statistical Inference

Probability Concepts, Conditional Probability, Bayes' Theorem, Probability Distributions, Binomial Distribution, Poisson Distribution, Normal Distribution, Sampling Distribution, Estimation, Hypothesis Testing, Chi-square Test, t-Test, ANOVA

Tutorials: Probability Problems, Hypothesis Testing using Excel/SPSS

Unit III: Regression, Correlation and Forecasting

Correlation Analysis, Simple Linear Regression, Multiple Regression, Time Series Analysis, Trend Analysis, Moving Average, Exponential Smoothing, Forecast Accuracy Measures, Business Forecasting Applications

Tutorials: Regression Analysis, Forecasting Models

Unit IV: Optimization and Decision Models

Linear Programming, Formulation of LPP, Graphical Method, Simplex Method (Concept), Transportation Problem, Assignment Problem, Decision Theory, Decision Trees, Risk Analysis, Sensitivity Analysis, Simulation Concepts

Tutorials: Linear Programming using Excel Solver, Decision Tree Exercises

Unit V: Business Analytics and Data-Driven Decision Making

Introduction to Business Analytics, Types of Analytics (Descriptive, Diagnostic, Predictive, Prescriptive), Data Mining Concepts, Dashboard Design, Key Performance Indicators (KPIs), Business Intelligence, Predictive Analytics, Introduction to Machine Learning for Managers, Applications in Technology Management

Tutorials: Dashboard Development, Analytics Case Study

Suggested Text Books

1. **Sancheti, D. C. & Kapoor, V. K. (2020).** *Business Statistics* (7th Edition). **Sultan Chand & Sons.**
2. **Levin, Richard I. & Rubin, David S. (2017).** *Statistics for Management* (8th Edition). **Pearson Education.**
3. **Anderson, David R., Sweeney, Dennis J. & Williams, Thomas A. (2019).** *Quantitative Methods for Business* (13th Edition). **Cengage Learning.**
4. **Camm, Jeffrey D., Cochran, James J., Fry, Michael J. & Ohlmann, Jeffrey W. (2020).** *Business Analytics* (4th Edition). **Cengage Learning.**

Reference Books

1. **Render, Barry, Stair, Ralph M. & Hanna, Michael E. (2018).** *Quantitative Analysis for Management* (13th Edition). **Pearson Education.**
2. **Sharma, J. K. (2020).** *Operations Research: Theory and Applications* (6th Edition). **Macmillan Publishers India.**
3. **Evans, James R. (2020).** *Business Analytics* (3rd Edition). **Pearson Education.**
4. **Albright, S. Christian & Winston, Wayne L. (2020).** *Business Analytics: Data Analysis and Decision Making* (7th Edition). **Cengage Learning.**
5. **Provost, Foster & Fawcett, Tom (2013).** *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking* (1st Edition). **O'Reilly Media.**

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	–	–	–	–	–	–	–	–	2	–
CO2	3	3	3	2	2	–	–	–	–	2	–	–
CO3	3	3	3	3	3	2	–	–	–	2	–	–
CO4	3	3	3	3	3	3	2	–	–	2	2	–
CO5	2	3	3	3	3	3	2	2	2	3	2	2
CO6	3	3	3	3	3	2	2	2	2	3	3	3

Correlation Levels:

3 – High, 2 – Moderate, 1 – Low, – No Correlation

Laboratory/Tutorial Components

Although the course has no separate practical credit, tutorials should be conducted in a computer laboratory using analytical software.

- MS Excel for statistical analysis
- Excel Solver for optimization models
- Power BI/Tableau (basic dashboards)
- SPSS/R/Python (introductory demonstrations)
- Business forecasting exercises
- Regression and hypothesis testing using real datasets
- Decision tree and risk analysis case studies
- KPI dashboard development for technology organizations

Experiential Learning Components

- Business analytics project using real organizational data
- Demand forecasting for a technology product
- Optimization of resource allocation using Linear Programming
- Dashboard development for managerial reporting
- Predictive analytics case study on customer behaviour
- Data visualization and storytelling for executive decision-making
- Group project on business intelligence applications in Industry 4.0
- Mini case studies on analytics-driven technology firms

