

QUANTITATIVE TECHNIQUES FOR MANAGERS

26MBPC504

(COURSE HANDBOOK)

MBA

COURSE FACULTY:

MS. AKSHITHA

1. General Information

Welcome to Quantitative Techniques for Managers!

This course equips students with a strong foundation in quantitative techniques and statistical methods that support effective managerial decision-making. It introduces essential concepts of statistics, probability, and optimization, enabling students to analyse business data systematically and make informed decisions in diverse organizational contexts.

The curriculum covers key topics such as measures of central tendency and dispersion, correlation and regression analysis, probability concepts, and theoretical probability distributions including Binomial, Poisson, and Normal distributions. Students also learn optimization techniques through Linear Programming Problems (LPP), along with time series analysis for forecasting business trends. Advanced topics such as job sequencing and simulation, including Monte Carlo Simulation, further enhance students' ability to solve complex operational and managerial problems.

A distinctive feature of the course is its emphasis on applying quantitative tools to real-world business scenarios. Through practical problem-solving and analytical techniques, students develop the skills required to evaluate alternatives, optimize resource utilization, forecast future trends, and support strategic decision-making using data-driven approaches.

By the end of the course, students will be able to summarize the fundamental concepts of statistics and quantitative techniques, apply statistical methods for business analysis, utilize probability distributions to predict outcomes, formulate and solve optimization problems, and analyze decision-making situations using simulation and quantitative models. This course provides a solid analytical foundation for future studies in business analytics, operations management, and managerial decision-making. We look forward to an engaging and insightful learning experience throughout the semester!

1.1 Course Objectives

- **Statistical Foundations:** Impart knowledge of statistical concepts and their role in managerial decision-making.
- **Statistical Applications:** Enables to apply statistical tools and techniques for effective business and managerial decision-making.
- **Optimization Tools:** Familiarize with mathematical techniques required to formulate and solve optimization problems.
- **Business Optimization:** Develop the ability to analyze business problems and apply quantitative optimization techniques to identify optimal solutions.

1.2 Course outcome

- CO1: Summarize the fundamental concepts statistics and quantitative techniques.
- CO2: Apply statistical tools for advanced data analysis for insightful data-driven decision-making.
- CO3: Utilize probability concepts and theoretical distributions to predict business outcomes.
- CO4: Analyze data and solve complex problems for optimum solution.
- CO5: Analyze decision theory techniques and simulation models to interpret and solve real-world problems.

1.3 Set Text and Suggested Sources

All the below mentioned books are available in the 1st Floor Library.

Key Text Books:

1. S C Gupta (2024), Fundamentals of Mathematical Statistics, 12ed, Sultan Chand &Sons.
2. Levin RI and Rubin D.S. Statistics for management, 7th edition, Printice Hall of India Pvt ltd, New Delhi, 2021.
3. J.K. Sharma, "Operation research", 2024, McMillan Publication.
4. H.A. Taha, "Operation Research: An Introduction", Pearson Publication, 10/e 2021.

Reference Books:

1. Albright and Winston, "Business Analytics – Data Analysis decision making", Cengage Publication, 2022.
2. James R Evan, "Business Analytics – Methods models and decisions", 3rd Edition, Pearson Publication, 2022.
3. H.S. Kasana & K.D Kumar, "Introductory Operations Research" -Theory and Applications, Springer Publication.
4. B. Uma Maheswari, R. Sujatha, "Introduction to Data Science: Practical Approach with R and Python, Wiley Publication 2021.
5. J K Sharma (2021), Business Statistics 5 ed, Vikas Publishing House.
6. N D Vohra, Quantitative Techniques in management, McGraw Hill, 5/e 2017.

2. THE COURSE

2.1 Course Description

QUANTITATIVE TECHNIQUES FOR MANAGERS			
Semester	**I**	CIE Marks	**50**
Course Code	**26MBPC504**	SEE Marks	**50**
Teaching Hrs/Week (L:T:P)	**4:0:0**	Exam Hrs	**03**
Total Hrs	**52**	Credits	**04**

The Quantitative Techniques for Managers course is designed to provide students with a strong foundation in statistical methods and quantitative techniques for effective managerial decision-making. The course will run for 13 weeks during Semester I and consists of 5 modules covering fundamental topics in statistics, correlation and regression, probability distributions, linear programming, time series, job sequencing, and simulation, with a focus on solving business and management-related problems. Each week includes 4 lectures, delivered by Ms. Akshitha, emphasizing theoretical concepts, quantitative problem-solving, and practical applications in business decision-making. Spanning a total of 52 hours, this 4-credit course is assessed through Continuous Internal Evaluation (CIE) for 50 marks and a Semester-End Examination (SEE) for 50 marks, with a 3-hour examination. This structure ensures a balanced and engaging learning experience while equipping students with the analytical and quantitative skills required to address real-world managerial challenges.

2.2 Initiating Contact with Staff and Other Students

We encourage open communication and value your inquiries about the Course. However, given the large number of students in this course, we encourage that you use email and any other forms of correspondence thoughtfully. Before reaching out with course questions, please check if your query has already been addressed in previous communications or in the materials provided in this handbook and on our website. Additionally, we encourage you to engage with your peers for discussions and collaborative learning, as this will enhance your understanding of the course material and foster a supportive academic community.

2.3 Resources

Resources go beyond just books—they include dynamic tools like digital libraries, e-learning platforms, and research databases. These modern learning environments offer anytime, anywhere access to academic materials, interactive courses, and cutting-edge research, empowering students to explore knowledge and excel in their fields.

Students can access a variety of resources through the college website. These include the VTU Consortium, e-learning platforms, and additional sources like open-access repositories, government portals (e.g., NPTEL, NDLI), These digital tools provide access to e-books, research papers, video lectures, and interactive tutorials, offering flexible and comprehensive learning environments.

E-learning and digital library can be accessed via the college website https://mite.ac.in/
(Campus Life section > Library > VTU Consortium/e-learning platforms/additional sources).

2.4 Staff

Course Convenor: Ms. Akshitha
Cabin: 3rd floor, PG Block
Email: akshitha@mite.ac.in

2.5 Topics and Reading materials for each module

Module 1 *No. of Hours: 10*

- **Topic: Introduction to Statistics**
  - Introduction to Statistics: Importance, Types, Measures of Central Tendency - Arithmetic mean, Median, Mode.
  - Measures of Dispersion -Range, Quartile deviation, Standard deviation, Variance, Coefficient of Variation.
- **Activities:**
  - Students are asked to select a listed company and collect its balance sheet data for the past five years. They calculate mean, median, range, standard deviation, variance, and coefficient of variation for selected balance sheet items. Students compare the variability and stability of different financial components and interpret what the statistical results indicate about the company's financial position.

- **Essential Readings:**
  - S C Gupta (2024), Fundamentals of Mathematical Statistics, 12ed, Sultan Chand &Sons – Chapter 2

- **Additional Reading:**
  - Levin RI and Rubin D.S. Statistics for management, 7th edition, Printice Hall of India Pvt ltd – Chapter 3

Module 2 *No. of Hours: 12*

- **Topic: Correlation and Regression**
  - Correlation - Significance, Types, and Methods, Scatter diagram, Karl Pearson correlation, Spearman's Rank correlation.
  - Regression - Significance, Linear Regression Analysis, Types of regression models, Lines of Regression, Standard error of Estimate.
- **Activities:**
  - Students select a listed company and collect historical stock prices for 5–10 years and prepare a scatter diagram, Karl Pearson's, Spearman's correlation and linear regression analysis to examine the relationship between stock price and market index. Finally, they interpret the results and present investment-related insights and conclusions.
- **Essential Reading:**
  - S C Gupta (2024), Fundamentals of Mathematical Statistics, 12ed, Sultan Chand &Sons – Chapter 8 and 9

- **Additional Reading:**
  - Levin RI and Rubin D.S. Statistics for management, 7th edition, Printice Hall of India Pvt ltd – Chapter 12.

Module 3 *No. of Hours: 11*

- **Topic: Probability Distribution**
  - Concept of probability, Baye's Theorem, Concept of Probability Distribution, Theoretical Probability Distributions - Binomial, Poisson, Normal.
- **Essential Reading:**
  - S C Gupta (2024), Fundamentals of Mathematical Statistics, 12ed, Sultan Chand &Sons – Chapter 3

- **Additional Reading:**
  - Levin RI and Rubin D.S. Statistics for management, 7th edition, Printice Hall of India Pvt ltd – Chapter 4 & 5

Module 4 *No. of Hours: 10*

- **Topic: Linear programming & Time Series**
  - Formulation of LPP, Guidelines for formulation of the linear programming model, Assumption, Linear Programming problem (LPP), optimal and feasible Solutions by graphical method (minimization and maximization).

- Time Series -Objectives, Variations in Time Series. Measurement of Trend, Graphic Method, Moving Average Method, Semi-Average Method, Least Square Method.

- **Activities:**

  Students select a listed company and collect 5–10 years of historical stock price data in Excel. Using Excel, they analyze the trend and variations through the graphic, moving average, semi-average, and least square methods, and use charts and formulas to forecast future stock prices. Finally, students compare the results of different methods and present their findings and investment insights.

- **Essential Reading**:
  - J.K. Sharma, "Operation research", 2014, McMillan Publication. Chapter 2.

- **Additional Reading:**
  - H.A. Taha, "Operation Research: An Introduction", Pearson Publication, 10/e – Chapter 2

Module 5 *No. of Hours:9*

- **Topic: Job Sequencing and Simulation**
  - Job Sequencing- 'n' jobs on 2 machines, 'n' jobs on 3 machines, 'n' jobs on 'm' machines.
  - Simulation: Process of Simulation, Types of Simulation, Steps in Simulation Process, Monte Carlo Simulation.
- **Essential Reading:**
  - J.K. Sharma, "Operation research", 2014, McMillan Publication. Chapter 19 and 20

- **Additional Reading:**
  - H.A. Taha, "Operation Research: An Introduction", Pearson Publication, 10/e – Chapter 18 and 19.

3 ASSESSMENT

The assessment for the Quantitative Techniques for Managers module is divided into two components: Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), each accounting for 50% of the total marks.

Continuous Internal Evaluation (CIE) comprises two internal tests, scheduled for 8th and 14th week, which together contribute 30% of the total marks. Additionally, students can earn 20% through the completion of assignments (10 marks are allotted for Descriptive Statistics and Monte Carlo Simulation Analysis, 10 marks are allotted for a Correlation, Regression and Time Series Analysis Using Company Stock Data).

Semester End Examination (SEE) constitutes the remaining 50% of the total marks. Key information regarding examination dates and related details can be accessed via the college website (Academics and Courses section > Calendar of Events > PG Odd Sem).

Rubrics for other Assessment (Total: 20 Marks / 40% of CIE)

1. Descriptive Statistics and Monte Carlo Simulation Analysis (10 Marks)				
Criteria	**Excellent (10)**	**Good (8)**	**Satisfactory (6)**	**Need Improvement (4)**
Data Collection	Complete and accurate real data collected	Minor missing data	Adequate data collected	Incomplete data
Data Analysis	Descriptive statistics correctly calculated and interpreted	Minor calculation/interpretation errors	Basic analysis completed	Limited analysis
Simulation	Simulation correctly performed and interpreted	Minor errors in simulation	Basic simulation completed	Incomplete simulation
Report Presentation	Well-organized report with charts and recommendations	Good presentation with minor errors	Average presentation	Poor presentation

2. Correlation, Regression and Time Series Analysis Using Company Stock Data (10 Marks)				
Criteria	**Excellent (10)**	**Good (8)**	**Satisfactory (6)**	**Need Improvement (4)**
Data Collection & Preparation	Relevant data collected accurately, properly organized.	Data mostly accurate and organized	Some data/source issues	Incomplete or inappropriate data
Correlation Analysis	Correct scatter diagram, correlation with interpretation	calculations with reasonable interpretation	Minor calculation errors	Major errors or incomplete analysis
Regression Analysis	Correct linear regression with managerial interpretation	Analysis correct with adequate interpretation	Basic analysis with limited interpretation	Incorrect/incomplete analysis
Time Series Analysis	Correctly applied analysis and identifies trend	Most methods applied correctly	methods applied with minor errors	Incomplete or incorrect application
Presentation & Managerial Insights	Clear presentation, meaningful conclusions	Presentation and conclusions	presentation with limited insights	Poor presentation and unclear conclusions