



Gyanmanjari
Innovative University

Syllabus
Gyanmanjari Institute of Management Studies
Semester-I(MBA)

Subject: Quantitative Techniques for Management – MBA2XX11505

Type of course: Core Course (CC)

Prerequisite: Students must have basic mathematics, computer Literacy and foundational business knowledge.

Rationale: This course equips students with Equips students with quantitative skills to analyze data, formulate business problems, and optimize decisions using statistical and operational research techniques essential for data-driven management across all business functions.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
CI	T	P	C	SEE	CCE	
4	0	0	4	100	50	150

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

Course Content:

Sr. No	Course Content	Hrs.	% Weightage
1	Foundations & Descriptive Statistics Theory Topics • Introduction to Quantitative Techniques and Role in Business Decision-Making • Measures of Central Tendency • Measures of Dispersion • Frequency Distributions and Data Visualization • Basic Matrix Operations (Addition, Subtraction, Multiplication)	05T 07P	20



Practical 1: Frequency Distribution Table Construction Students will collect or be provided with raw business data and organize it into frequency tables. Practical 2: Data Visualization Exercise Students will create graphical representations of datasets such as bar charts, histograms, and pie charts using spreadsheet software. They must interpret the visuals to derive meaningful insights for business decisions. Practical 3: Spreadsheet-Based Central Tendency Calculation Students will calculate mean, median, and mode for business datasets using Excel or Google Sheets. They must analyze and explain which measure best represents the data for managerial use. Practical 4: Dashboard Creation Students will design a mini-dashboard using excel integrating central tendency, dispersion, and graphical data representations. They must ensure the dashboard is user-friendly and interpretable for quick business decision-making. Practical 5: Practical Matrix Operations Students will perform matrix addition, subtraction, and multiplication on datasets representing business scenarios such as resource allocation or cost analysis. They must interpret the results in a managerial context. Examination Style: <table> <tr> <th>Sr. No</th><th>Evaluation Methods</th><th>SEE</th><th>CCE</th></tr> <tr> <td>1</td><td> ALA 1: Employee Salary Equity Analysis Students will analyze salary datasets across departments, calculate measures of dispersion, and measures of central tendency. They must provide recommendations for salary standardization and equity improvement upload that on the GMIU Web Portal. </td><td></td><td>10</td></tr> <tr> <td>2</td><td> Watch Summarize Question: Faculty will provide calculative questions and Students need to prepare the excel for the answer and submit to the faculty. </td><td>20</td><td></td></tr> <tr> <td></td><td>Total</td><td>20</td><td>10</td></tr> </table>				Sr. No	Evaluation Methods	SEE	CCE	1	ALA 1: Employee Salary Equity Analysis Students will analyze salary datasets across departments, calculate measures of dispersion, and measures of central tendency. They must provide recommendations for salary standardization and equity improvement upload that on the GMIU Web Portal.		10	2	Watch Summarize Question: Faculty will provide calculative questions and Students need to prepare the excel for the answer and submit to the faculty.	20			Total	20	10
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2	Probability & Distributions Theory Topics • Probability Theory • Discrete Probability Distributions • Normal Distribution and Its Business Applications • Sampling Methods and Sampling Distributions • Confidence Intervals and Point Estimation Practical 1: Probability Theory Simulation Students will analyze business-related uncertain events and calculate probabilities using basic probability rules. They must simulate scenarios such as customer arrivals, product demand, or sales target achievement using spreadsheet tools and interpret the likelihood of different business outcomes for managerial decision-making. Practical 2: Discrete Probability Distribution Modeling Students will prepare discrete probability distributions using business data such as number of customer purchases, daily complaints, or defective products. They must calculate probabilities, expected values, and variances to understand how discrete distributions support operational and marketing decisions. Practical 3: Sampling Method Simulation Students will design and implement different sampling methods including random, systematic, stratified, and convenience sampling using survey or business data. They must compare sampling approaches and evaluate their suitability for management research and data collection processes. Practical 4: Point Estimation Practice Students will use sample business data to estimate population parameters such as average sales, customer spending, or employee productivity. They must apply point estimation techniques and interpret the reliability of estimates for managerial planning and forecasting. Practical 5: Business Case Simulation Students will analyze a business scenario involving uncertainty and risk, such as demand fluctuation, inventory shortages, or customer churn. They must apply probability concepts and quantitative techniques to evaluate possible outcomes and recommend suitable business decisions.	05T 07P	20
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Examination Style:					
Sr. No	Evaluation Methods	SEE	CCE		
1	ALA 3: Retail Sales Normal Distribution Analysis Students will examine retail sales data to study the application of normal distribution in business environments. They must calculate measures such as mean and standard deviation, plot distribution patterns using spreadsheet tools, and interpret sales behavior for forecasting and inventory management purposes and upload on the GMIU Web Portal.		10		
2	Real Time Problem Solving Faculty will Provide list of real time problems, which students need to solve and submit to the faculty.	20			
	Total	20	10		
3	Hypothesis Testing & Regression Theory Topics • Hypothesis Testing Fundamentals • Chi-Square Test and Test of Independence • Correlation Analysis • Simple Linear Regression • Multiple Linear Regression and Model Diagnostics Practical 1: Formulating Hypotheses Faculty will provide problems on which students need to formulate appropriate null and alternative hypotheses using real-world datasets. They must define research objectives, select suitable variables, and frame statistically testable assumptions for managerial decision-making. Practical 2: Hypothesis Testing Students will perform hypothesis testing using statistical tools such as Excel, SPSS, or Python. They must calculate test statistics, compare p-values with significance levels, and interpret results to make data-driven business conclusions. Practical 3: Simple Linear Regression – Manual Calculation vs Practical Students will analyze the relationship between dependent and independent variables by calculating regression equations manually and validating results using software tools. They must interpret regression			05T 07P	20



	coefficients, slope, intercept, and coefficient of determination (R^2) for managerial applications. Practical 4: Correlation Matrix Creation Students will create a correlation matrix using multiple quantitative variables from a business dataset. They must analyze the strength and direction of relationships between variables and interpret the managerial significance of highly correlated factors Examination Style: <table> <tr> <th>Sr. No</th><th>Evaluation Methods</th><th>SEE</th><th>CCE</th></tr> <tr> <td>1</td><td> ALA 3: Correlation calculation Students will calculate correlation coefficients using spreadsheet tools to evaluate relationships between business variables. They must classify correlations as positive, negative, or negligible and interpret their implications for business analysis and forecasting and upload it on GMIU web portal. </td><td></td><td>10</td></tr> <tr> <td>2</td><td> Case Study Students need to solve the case study given by faculty. </td><td>20</td><td></td></tr> <tr> <td></td><td>Total</td><td>20</td><td>10</td></tr> </table>	Sr. No	Evaluation Methods	SEE	CCE	1	ALA 3: Correlation calculation Students will calculate correlation coefficients using spreadsheet tools to evaluate relationships between business variables. They must classify correlations as positive, negative, or negligible and interpret their implications for business analysis and forecasting and upload it on GMIU web portal.		10	2	Case Study Students need to solve the case study given by faculty.	20			Total	20	10		
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4	Linear Programming & Optimization Theory Topics - Linear Programming Formulation and Graphical Method - Simplex Method for Linear Programming - Transportation Problem (Vogel's Approximation Method, MODI Method) - Assignment Problem (Hungarian Algorithm) - Sensitivity Analysis and Shadow Prices Practical 1: Product Mix Optimization Using Graphical Method Students will formulate a Linear Programming Problem for a manufacturing business producing two products under limited resource constraints such as labor hours and raw materials. They must develop objective functions and constraints, plot the feasible region graphically using spreadsheet software, identify corner points, and determine the optimal product mix for maximum profit. Practical 2: Simplex Method Manual Iteration Practice Students will solve a Linear Programming Problem using the simplex method through manual iterations. They must construct simplex tables,	05T 07P	20																



	identify entering and leaving variables, perform pivot operations, and interpret intermediate and final solutions. Students will also validate their results using Excel Solver or equivalent optimization software. Practical 3: Sensitivity Analysis Using Excel Solver Reports Students will analyze the impact of changes in resource availability and constraints on an optimization model using Excel Solver reports. They must interpret sensitivity analysis outputs such as shadow prices, allowable increase/decrease ranges, and binding/non-binding constraints to support managerial decision-making. Practical 4: Startup Resource Allocation Simulation Students will simulate resource allocation decisions for a startup business operating under limited financial and operational resources. They must formulate an optimization model for allocating resources across multiple business functions such as marketing, operations, and technology to maximize return on investment or business performance. Examination Style: <table> <tr> <th>Sr. No</th><th>Evaluation Methods</th><th>SEE</th><th>CCE</th></tr> <tr> <td>1</td><td> ALA 4: Transportation Problem – MODI Method Students will optimize a transportation problem using the MODI (Modified Distribution) Method after obtaining an initial feasible solution. They must calculate opportunity costs, identify optimal routes, revise allocations iteratively, and determine the minimum transportation cost for distributing goods between supply centers and demand locations and upload on GMIU Web Portal. </td><td></td><td>10</td></tr> <tr> <td>2</td><td> Article Writing: Students will write a structured article on the topics assigned by faculty. </td><td>20</td><td></td></tr> <tr> <td></td><td>Total</td><td>20</td><td>10</td></tr> </table>	Sr. No	Evaluation Methods	SEE	CCE	1	ALA 4: Transportation Problem – MODI Method Students will optimize a transportation problem using the MODI (Modified Distribution) Method after obtaining an initial feasible solution. They must calculate opportunity costs, identify optimal routes, revise allocations iteratively, and determine the minimum transportation cost for distributing goods between supply centers and demand locations and upload on GMIU Web Portal.		10	2	Article Writing: Students will write a structured article on the topics assigned by faculty.	20			Total	20	10		
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5	Forecasting, Networks & Inventory Theory Topics • Time Series Analysis and Forecasting • Network Analysis - PERT/CPM • Queuing Theory • Inventory Models • Decision Theory and Game Theory	05T 07P	20																



Practical 1: Time Series Forecasting Using Excel
Students will collect or use historical business data and apply time series forecasting techniques in Excel. They must analyze trends and patterns using moving averages and exponential smoothing methods, prepare forecasts, and interpret the accuracy of predicted values through graphical and numerical analysis.

Practical 2: PERT/CPM Project Scheduling
Students will develop a project network diagram using PERT/CPM techniques for a given business or operational scenario. They must identify activity sequences, calculate earliest and latest times, determine slack, and identify the critical path for effective project scheduling and monitoring.

Practical 3: EOQ and Reorder Point Calculation
Students will analyze inventory-related data to determine the Economic Order Quantity (EOQ) and reorder point for a business scenario. They must evaluate ordering costs, holding costs, and demand patterns to recommend an efficient inventory management strategy.

Practical 4: Decision Tree Analysis
Students will analyze business decision-making situations using decision tree techniques. They must calculate expected monetary values (EMV), evaluate alternative courses of action under uncertainty, and recommend the most suitable decision based on quantitative analysis.

Examination Style:

Sr. No	Evaluation Methods	SEE	CCE
1	ALA :5 Queuing Theory – Single Channel Students will examine a single-channel service system by analyzing customer arrival rates and service rates. They must calculate waiting time, queue length, and system utilization to evaluate service efficiency and suggest operational improvements and upload it on GMIU Web Portal		10
2	Quiz: Students will participate in an online quiz designed to evaluate their conceptual understanding and analytical application of forecasting, network analysis, queuing theory, inventory models, and decision-making	20	



		techniques. The test may include objective questions.				
		Total	20	10		

Suggested Specification table:

Distribution of Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage %	10%	20%	30%	20%	10%	10%

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	Recall and explain foundational quantitative concepts, including measures of central tendency, dispersion, and frequency distributions, for organizing and presenting business data.
CO2	Apply probability theory and standard probability distributions to model business uncertainty and support decisions involving risk.
CO3	Analyze business data using hypothesis testing, correlation, and regression techniques to draw statistically valid, decision-relevant conclusions.
CO4	Evaluate and solve linear programming and related optimization problems to support resource allocation and operational decisions.
CO 5	Create forecasting, network, inventory, and decision-theory models to support planning under uncertainty.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. A minimum of 20–30% of the course content shall be suggested to deliver through Flipped Learning, where students study digital learning resources before the classroom session.

Classroom time shall be utilized for discussion, problem-solving, practical applications, and higher-order learning activities.

Students shall be encouraged to use AI-powered learning platforms, simulation software, virtual laboratories, digital libraries, research databases, online certification courses, NPTEL, SWAYAM, MOOCs, and other technology-enabled learning resources to strengthen conceptual understanding and practical competence.



Continuous assessment shall be conducted through Active Learning Assignments (ALAs), quizzes, skill demonstrations, presentations, practical exercises, projects, case studies, innovation activities, peer assessment, reflective learning, and industry-oriented tasks instead of relying primarily on conventional written assignments.

Reference Books:

- [1] Mishra, P. N., & Jaisankar, S. (2007). Quantitative techniques for management. School of Distance Education, Bharathiar University. Printed by Excel Books Private Limited.
- [2] Vohra, N. D. (2017). Quantitative techniques in management (5th ed.). McGraw Hill Education.
- [3] Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., & Cochran, J. J. (2020). Quantitative methods for business (14th ed.). Cengage Learning.
- [4] Levin, R. I., Rubin, D. S., Rastogi, S., & Siddiqui, M. H. (2017). Statistics for management (8th ed.). Pearson Education.
- [5] Gupta, P. K., & Hira, D. S. (2018). Business mathematics and statistics. S. Chand Publishing.

Suggested Guidelines:

SEE	Topic	Criteria	Marks	Description
1	WSQ (Watch Summarize Question)	Content Understanding & Accuracy	10	Demonstrates a clear understanding of the given question by presenting accurate, relevant, and well-organized content. The answer reflects conceptual clarity, logical explanation, and appropriate use of examples, facts, or supporting information where applicable.
		Presentation, Structure & Timely Submission	10	Presents the answer in a well-formatted PDF with proper organization, headings, grammar, and professional appearance. The submission follows the given instructions, is free from major errors, and is submitted within the prescribed deadline.
2	Real time Problem Solving	Problem Analysis & Solution Development	10	Demonstrates a clear understanding of the given authentic problem by identifying key issues, applying relevant concepts and techniques, and developing logical, feasible, and well-supported solutions.
		Application, Presentation & Submission	10	Presents the solution in a well-structured and organized format with appropriate calculations, explanations, and professional



				presentation. The work is complete, accurate, and submitted within the prescribed deadline.
3	Case Study	Case Analysis & Conceptual Application	10	Demonstrates the ability to analyze the case effectively by identifying key issues, applying relevant concepts and theories, and providing logical, evidence-based solutions and recommendations.
		Report Organization & Presentation	10	Presents the case study in a clear, well-structured, and professional format with logical flow, proper language, supporting data (where applicable), and timely submission.
4	Article Writing	Content Quality & Conceptual Understanding	10	Demonstrates thorough understanding of the assigned topic through relevant, accurate, and well-researched content. Ideas are logically developed with appropriate examples, facts, and references where applicable.
		Writing Style, Structure & Presentation	10	Presents the article in a clear and organized structure with appropriate headings, coherence, grammar, originality, and professional formatting. The article is submitted within the given deadline.
5	Quiz	Conceptual Understanding	10	Demonstrates a strong understanding of forecasting, network analysis, queuing theory, inventory models, and decision-making techniques by correctly answering objective and application-based questions. .
		Analytical Application & Performance	10	Applies analytical thinking and problem-solving skills to answer questions accurately within the allotted time, demonstrating logical reasoning and effective decision-making abilities.

