



RV Institute of Management

**Master of Business Administration (MBA)
Batch 2024 – 26**

Semester I

23MBA211 – APPLICATION OF STATISTICS IN BUSINESS

Course Pack

2024–2025

VISION

To become a world-class management institute of eminence.

MISSION

To nurture Universal Thought Leaders by offering holistic management education fostering Business Intelligence, Health Care, Innovation and Entrepreneurship for Inclusive Growth and Sustainable Development

AND

To provide value added services to Business, Government and Society through Staff Empowerment, Joint Research and Collaborative Engagement.

Program Educational Objectives (PEOs)

- PEO 1: Graduates will be able to demonstrate effective decision making, cognitive flexibility, and problem-solving capability and adapt to the changing global environment
- PEO 2: Graduates will be capable of innovating, starting new entrepreneurial ventures and be a lifelong learner with multidisciplinary research aptitude
- PEO 3: Graduates will be able to think critically; communicate effectively; demonstrate analytical skills, team spirit and leadership qualities
- PEO 4: Graduates will be able to demonstrate professional values, cultural sensitization, ethical behavior and integrity
- PEO 5: Graduates will be responsible global citizens and contribute towards inclusive growth and sustainable development of the society

Program Objectives (POs)

1. Apply knowledge of management theories and practices to solve business problems with required abilities to understand, analyze and communicate global, economic, societal, cultural, legal and ethical aspects of business
2. Foster Analytical and critical thinking abilities for data-driven decision making
3. Ability to develop value based leadership to lead themselves and others in the achievement of organizational goals and contributing effectively to a team environment through effective communication and Negotiation skills
4. Ability to identify business opportunities, frame innovative solutions and launch new business ventures or be an intrapreneur
5. Ability to deal with contemporary issues using multi-disciplinary approach with the help of advanced Management and IT tools and techniques
6. Ability to apply domain specific knowledge and skills to build competencies in their respective functional area
7. Ability to engage in research and consultancy work with cognitive flexibility to create new knowledge and be a lifelong learner
8. Ability to understand social responsibility and contribute to the community for inclusive growth and sustainable development of society through ethical behavior

RV Institute of Management

Course Plan

Program	Master of Business Administration
Course Code & Name	23MBA211 – APPLICATION OF STATISTICS IN BUSINESS
Semester	Semester I
Hours & Credits	48 Hours, 4 Credits (1 Credit = 12 hours)
Course Anchor	Faculty – Department of Quantitative Methods / Business Analytics
Course Facilitators	Faculty of Statistics RV Institute of Management

APPLICATION OF STATISTICS IN BUSINESS

COURSE DOCKET – INDEX

SEMESTER: I

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1	Course Syllabus
2	Course Session Plan
3	Case – Descriptive Statistics for Sales Forecasting at an FMCG Company
4	Case – Measures of Dispersion in Risk Assessment at a Pharmaceutical Firm
5	Case – Correlation and Regression Analysis in Real Estate Price Prediction
6	Case – Probability Models for Insurance Premium Setting
7	Case – Hypothesis Testing for Quality Control at a Manufacturing Plant
8	Case – Chi-Square Test for Market Research and Consumer Preference Study
9	Case – ANOVA for Comparing Sales Performance Across Regions

Course Syllabus

Course Name: APPLICATION OF STATISTICS IN BUSINESS	Course Code: 23MBA211
Total number of hours: 48 Hrs	Credits: 4
Total Number of Sessions: 48	Hours per Session: 1 hour

Course Description:

Statistics is a powerful tool that enables businesses to gather, analyze and interpret data to gain valuable insights and make data-driven decisions. Statistical analysis is a dynamic and evolving field. Embracing its principles will provide a competitive edge in today's data-driven business landscape. Understanding how to apply statistical methods is essential for success for any business whether it's a start-up or a large corporation. Key areas covered: Descriptive Statistics, Probability, Regression, Correlation, Time Series, and Inferential Statistics.

Course Outcomes: Having successfully completed this course the students will be able to:

CO1: Solve problems involving central tendency in various contexts such as business, science, and social sciences.

CO2: Apply & Compute the concepts of dispersion, skewness and kurtosis to real-world business problems and draw meaningful insights about their characteristics.

CO3: Analyze relationships between variables and make predictions based on data.

CO4: Demonstrate the knowledge and skills needed to work with probability, probability distribution and their applications across various disciplines.

CO5: Conduct hypothesis tests effectively, draw meaningful conclusions and contribute to evidence-based decision-making in various fields.

Pedagogy:

This course uses multiple pedagogies including classroom discussions, SPSS lab sessions, project-based learning, workshop from practitioners, and case-based teaching.

Syllabus

Module 1: Measures of Central Tendency (8 Hours)

- Introduction to basic measures of central tendency: Mean (AM, GM, HM), Median, Mode
- Missing value cases in basic measures
- Problems on missing frequency
- Empirical relationships between basic measures
- Application of central tendency in functional areas of business

Module 2: Measures of Dispersion, Skewness and Kurtosis (8 Hours)

- Comparison between various measures of dispersion: Range, Quartile Deviation, Mean Deviation
- Standard deviation and Coefficient of variance – Partition values
- Karl Pearson's co-efficient of Skewness
- Bowley's co-efficient of Skewness
- Measures of kurtosis: Mesokurtic, Leptokurtic, Platykurtic

Module 3: Correlation & Regression Analysis (10 Hours)

- Introduction and significance of correlation and Regression
- Methods of correlation Analysis; Scatter diagram
- Karl Pearson's coefficient of Correlation for Univariate and Bivariate series
- Spearman's Rank Correlation; Concurrent deviation method
- Simple regression analysis: Regression lines, equations and coefficients

Module 4: Probability and Theoretical Distribution (8 Hours)

- Concept and Definition of probability and theories of probability
- Relevance of Permutations and Combinations to Probability
- Rules of Probability: Addition rule, Multiplication rule; Bayes' theorem (theory) & its applications
- Probability Distributions – Binomial, Poisson and Normal distribution

Module 5: Testing of Hypotheses (14 Hours)

- Hypothesis Testing: Concept; Formulation; Errors: Type I and Type II error
- Parametric tests: z-test; t-test; f-test
- Chi-Square test
- Analysis of Variance (ANOVA) – one way and two way
- Non-parametric tests (theory): Sign test; Mann-Whitney U test; Median Run test; Kolmogorov–Smirnov one sample test

Teaching Learning Resources:

Recommended Books:

9. James R. Evans, "Business Analytics – Methods, Models and Decisions", Prentice Hall; T N Srivastava, Shailaja Rego, "Statistics for Management", Tata McGraw Hill
10. SP Gupta, "Statistical Methods", Sultan Chand & Sons
11. Glynn Davis and Branko Pecar, "Business Statistics using excel", Oxford University Press
12. J K Sharma, "Fundamentals of Business Statistics", Vikas Publication

Reference Books:

13. Keller/Arora, "BSTAT: A South-Asian Perspective", Cengage Learning
14. S C Gupta, "Fundamentals of Statistics", Himalaya Publications
15. N D Vohra, "Business Statistics", Tata McGraw Hill
16. Levin & Rubin, "Statistics for Management", Prentice-Hall
17. Richard I. Levin, David S. Rubin, Masood H. Siddiqui, Sanjay Rastogi, "Statistics for Management", Pearson India
18. Amir D Aczel, Jayavel Sounderpandian, Palaniswamy Saravanan, Rohit Joshi, "Complete Business Statistics", McGraw Hill Education
19. Statistics for Managers Using Microsoft Excel, 9th Edition, David M. Levine, Pearson

Supplementary Reading:

20. <https://www.coursera.org/learn/basic-statistics?specialization=social-science>
21. <https://www.edx.org/learn/statistics>
22. Pearson e-library: <https://elibrary.in.pearson.com/bookshelfDashboard>
23. EBSCO: <https://www.ebsco.com/search?search=supplychainmodel>
24. Jgate: <https://jgateplus.com/home/resources/> | www.capitaline.com

CO-PO Mapping

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Application of Statistics in Business – Session Plan (48 Sessions)

Mod.	Sess.	Coverage	Pedagogy / Activities	Resource / Reference	Video Link (Scan QR)
1	1	Overview of course plan; Introduction to Statistics: nature, scope, and importance in business decision-making	Interactive class discussion	SP Gupta Ch.1 Pg. 1-14	 Intro: Mean/Median/Mode
1	2	Arithmetic Mean: simple and weighted; ungrouped and grouped data; step-deviation method	Discussion + Numericals	SP Gupta Ch.2 Pg. 16-38	 AM for Grouped Data
1	3	Geometric Mean and Harmonic Mean: computation and applications in business	Discussion + Numericals	SP Gupta Ch.2 Pg. 39-58	 GM and HM Explained
1	4	Median: individual, discrete and continuous series; Quartiles, Deciles, Percentiles	Discussion + Numericals	SP Gupta Ch.3 Pg. 60-78	 Median - Missing Frequency
1	5	Mode: individual, discrete and continuous series; locating mode graphically	Discussion + Numericals	SP Gupta Ch.3 Pg. 79-94	 Median and Mode
1	6	Missing value cases in basic measures; Problems involving missing observations	Discussion + Numericals	SP Gupta Ch.2-3	 GM HM Problems
1	7	Problems on missing frequency; Empirical relationships between Mean, Median and Mode	Discussion + Numericals	SP Gupta Ch.3 Pg. 95-110	 Empirical Relations
1	8	Application of central tendency in functional areas of business; Case Discussion	Case Discussion	Industry Case Study	 Business Applications CT
2	9	Measures of Dispersion: concept and significance; Range and Quartile Deviation	Interactive class discussion	SP Gupta Ch.4 Pg. 114-130	 Range & Quartile Deviation

2	10	Mean Deviation: individual, discrete and continuous series; limitations	Discussion + Numericals	SP Gupta Ch.4 Pg. 131-148	 Mean Deviation
2	11	Standard Deviation: individual and discrete series; variance; properties	Discussion + Numericals	SP Gupta Ch.4 Pg. 149-166	 Standard Deviation
2	12	Standard Deviation: continuous series; combined SD; step- deviation method	Discussion + Numericals	SP Gupta Ch.4 Pg. 167-182	 SD Grouped Data
2	13	Coefficient of Variation; Partition values: Quartiles, Deciles, Percentiles for grouped data	Discussion + Numericals	SP Gupta Ch.4 Pg. 183-198	 CV and Partition Values
2	14	Skewness: concept and types; Karl Pearson's Coefficient of Skewness	Discussion + Numericals	SP Gupta Ch.5 Pg. 200-216	 Karl Pearson Skewness
2	15	Bowley's Coefficient of Skewness; comparison of skewness measures	Discussion + Numericals	SP Gupta Ch.5 Pg. 217-228	 Bowley's Skewness
2	16	Kurtosis: concept; Mesokurtic, Leptokurtic, Platykurtic; Case Discussion: Risk Assessment	Case Discussion	Industry Case Study	 Kurtosis Explained
3	17	Correlation: introduction, significance and types; positive, negative and zero correlation	Interactive class discussion	SP Gupta Ch.6 Pg. 232-248	 Intro to Correlation
3	18	Scatter Diagram: construction and interpretation; properties of correlation coefficient	Discussion	SP Gupta Ch.6 Pg. 249-260	 Scatter Diagram
3	19	Karl Pearson's Coefficient of Correlation: ungrouped data; direct method and short-cut method	Discussion + Numericals	SP Gupta Ch.6 Pg. 261-278	 Karl Pearson r

3	20	Karl Pearson's Coefficient of Correlation: bivariate (grouped) data; step-deviation method	Discussion + Numericals	SP Gupta Ch.6 Pg. 279-294	 Pearson Grouped Data
3	21	Spearman's Rank Correlation: without ties; computation and interpretation	Discussion + Numericals	SP Gupta Ch.6 Pg. 295-308	 Spearman Rank Corr.
3	22	Spearman's Rank Correlation: with ties (repeated ranks); formula and examples	Discussion + Numericals	SP Gupta Ch.6 Pg. 309-320	 Spearman With Ties
3	23	Concurrent Deviation Method: concept, computation and limitations	Discussion + Numericals	SP Gupta Ch.6 Pg. 321-330	 Concurrent Deviation
3	24	Regression Analysis: concept and significance; difference between correlation and regression	Interactive class discussion	SP Gupta Ch.7 Pg. 334-346	 Regression Intro
3	25	Regression lines: Line of Y on X and Line of X on Y; regression coefficients; properties	Discussion + Numericals	SP Gupta Ch.7 Pg. 347-362	 Regression Lines
3	26	Regression equations: numerical problems; prediction; Case Discussion: Real Estate	Case Discussion + Numericals	Industry Case Study	 Regression Problems
4	27	Probability: concept, definition and theories (Classical, Relative, Subjective)	Interactive class discussion	SP Gupta Ch.8 Pg. 366-380	 Probability Basics
4	28	Permutations and Combinations: concept and relevance to probability	Discussion + Numericals	SP Gupta Ch.8 Pg. 381-396	 Permutations & Combs.
4	29	Rules of Probability: Addition rule; Multiplication rule; Conditional probability	Discussion + Numericals	SP Gupta Ch.8 Pg. 397-414	 Probability Rules

4	30	Bayes' Theorem: concept, derivation and applications in business decision-making	Discussion + Numericals	SP Gupta Ch.8 Pg. 415-432	 Bayes' Theorem
4	31	Binomial Distribution: concept, properties, mean and variance; numerical problems	Discussion + Numericals	SP Gupta Ch.9 Pg. 436-452	 Binomial Distribution
4	32	Poisson Distribution: concept, properties, mean and variance; numerical problems	Discussion + Numericals	SP Gupta Ch.9 Pg. 453-468	 Poisson Distribution
4	33	Normal Distribution: concept, properties, standard normal distribution; z-score	Discussion + Numericals	SP Gupta Ch.9 Pg. 469-484	 Normal Distribution
4	34	Normal Distribution: numerical problems; area under normal curve; Case Discussion: Insurance	Case Discussion + Numericals	Industry Case Study	 Normal Curve Problems
5	35	Hypothesis Testing: concept; Null and Alternate hypothesis; Level of significance; p-value	Interactive class discussion	SP Gupta Ch.10 Pg. 488-504	 Hypothesis Testing Intro
5	36	Errors: Type I error (α) and Type II error (β); Critical region; One-tailed and two-tailed tests	Discussion	SP Gupta Ch.10 Pg. 505-518	 Type I and II Errors
5	37	z-test: test for single population mean; known variance; large samples ($n \geq 30$)	Discussion + Numericals	SP Gupta Ch.11 Pg. 520-536	 z-test Explained
5	38	z-test: test for difference between two population means; test for population proportion	Discussion + Numericals	SP Gupta Ch.11 Pg. 537-552	 z-test Problems
5	39	t-test: one-sample t-test; unknown variance; small samples ($n < 30$); t-distribution	Discussion + Numericals	SP Gupta Ch.11 Pg. 553-568	 t-test One Sample

5	40	t-test: two-sample independent t-test; paired t-test; numerical problems	Discussion + Numericals	SP Gupta Ch.11 Pg. 569-584	 t-test Two Sample
5	41	F-test (Variance Ratio Test): concept and computation; introduction to ANOVA	Discussion + Numericals	SP Gupta Ch.12 Pg. 586-600	 F-test and ANOVA
5	42	One-Way ANOVA: concept, assumptions and computation; between-group and within-group variance	Discussion + Numericals	SP Gupta Ch.12 Pg. 601-618	 One-Way ANOVA
5	43	Two-Way ANOVA: concept, computation and interpretation; interaction effects	Discussion + Numericals	SP Gupta Ch.12 Pg. 619-636	 Two-Way ANOVA
5	44	Chi-Square Test: goodness of fit; test of independence; contingency tables	Discussion + Numericals	SP Gupta Ch.13 Pg. 638-654	 Chi-Square Test
5	45	Chi-Square: numerical problems; Yates correction; Case Discussion: Market Research	Case Discussion + Numericals	Industry Case Study	 Chi-Square Problems
5	46	Non-parametric tests (theory): Sign test; concept and applications	Discussion	SP Gupta Ch.14 Pg. 656-668	 Sign Test
5	47	Mann-Whitney U test: concept and application; Median Run test	Discussion	SP Gupta Ch.14 Pg. 669-682	 Mann-Whitney U Test
5	48	Kolmogorov-Smirnov one sample test; Course wrap-up and revision	Discussion	SP Gupta Ch.14 Pg. 683-696	 Kolmogorov-Smirnov Test

Course Evaluation Plan

Component	Description	Units	Marks	Timeline
End Term	End Term Exam – All Modules 1–5	All Modules	50	End of semester
CIA-I (Mid-Term)	Mid-Term Test – Modules 1, 2 & 3	Modules 1–3	20	After 2–3 modules
CIA-II	Attendance and Class Participation	NA	5	End of semester
CIA-III	Quiz – Modules 1–5	All Modules	5	After each module
CIA-IV	Remaining assignments (Quiz, Individual assignment, CapStone project, Major or minor project, Group assignments etc.)	All Modules	25	Full Semester
Total			100	-

EVALUATION DESCRIPTION

CIA-I – Mid-Term Test (CO1, CO2, CO3) – 20 Marks

Mid Term Exam Syllabus: Module I, II and III

Pattern:

- Evaluation through numerical problems, short theory questions and case-based analytical questions
- Duration: 1.5 hours | Closed book | Scientific calculator permitted
- Total of 50 marks converted to 20

CIA-II – Attendance and Class Participation – 5 Marks

- Active participation in classroom discussions, SPSS lab sessions, and case discussions
- Consistent attendance throughout the semester

CIA-III – Quiz – 5 Marks

- 10 questions from each module carrying 1 mark each. Total 50 marks converted to 5 marks.

CIA-IV – Capstone Project – 25 Marks

Capstone Project: Statistical Analysis for Business Decision-Making

- Students collect a real-world dataset from a business domain and perform comprehensive statistical analysis
- Analysis must include: descriptive statistics, correlation and regression, probability application, and hypothesis testing
- Submit report with manual calculation AND SPSS output for each analysis technique

Rubrics:

S.No.	Parameters	Marks
1	Problem Identification and Selection of Appropriate Statistical Technique	5
2	Accuracy of Computation and Correct Application of Statistical Formulae	8
3	Interpretation, Analysis and Business Insights from Statistical Results	7
4	Quality of Report / Presentation and SPSS Output	5
Total		25

Prepared by

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Course Faculty – Application of Statistics in Business

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