Royal College of Arts, Science and Commerce

(Autonomous)

Affiliated to University of Mumbai

OPEN

ELECTIVE

Course: DATA ANALYSIS AND VISUALIZATION

Syllabus for Semester: I

Syllabus for Undergraduate Programme as per National Education Policy (NEP-2020)

with effect from the academic year

2025-2026

Course/ Paper Title	**Data analysis and visualization**
Course offered as	**Open elective (OE)**
Course Code	**RUSMAOE101**
Semester	**I**
No. of Credits	**2**
No. of lecture Hours/week	**2**

Sr No.	**Course Learning Objectives:**
CLO1	to give deep understanding of fundamental statistical concepts and apply this knowledge for effective data representation.
CLO3	to enhance critical thinking skills by analyzing and interpreting statistical findings like averages and dispersion of the given data.

Course Outcomes:

	On completing the course, the student will be able to:
CO1	analyze data patterns, relationships and frequency distributions using statistical tools and create various graphical representations for qualitative and quantitative data.
CO2	apply statistical concepts like averages and dispersion and evaluate the corresponding statistical measures to real-world datasets.

Detailed Syllabus:

Module	Title with content	No. of lectures
I	**Introduction to Statistics:** Statistics: Definition and scope. Concepts of statistical population and sample, drawing samples using: Simple random sampling, Stratified, Systematic and Cluster sampling methods (concepts only). **Data:** Quantitative and qualitative, discrete and continuous. Scales of measurement: nominal, ordinal, interval and ratio. Collection of data, Presentation of data: tabular, Frequency distributions, cumulative frequency distributions. **Graphs:** Drawing of Frequency Curves, Histogram and ogives. Use of software (SPREADSHEET) for data visualization.	15 Hours
II	**Univariate data analysis:** **Measures of Central Tendencies:** Definition of Average, Types of Averages, Arithmetic Mean, Median, and Mode for grouped as well as ungrouped data. Quartiles, Deciles and Percentiles. Using Ogive to locate median and Quartiles. Using Histogram to locate mode. Combined and Weighted mean. **Measures of Dispersion:** Concept and idea of dispersion. Various measures Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Combined Variance. Use of SPREADSHEET for data analysis.	15 Hours

Reference Books:

1. Statistics for Management - Levin R., Rubin D.S. (Prentice Hall of India)

Additional Reference Books:

1. Statistics - Theory, Method & Applications D. S. Sancheti & V. K. Kapoor.
2. Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000
3. STATISTICS by Schaum Series

Royal College of Arts, Science and Commerce

(Autonomous)

Affiliated to University of Mumbai

OPEN

ELECTIVE

Course: DATA ANALYSIS AND FORECASTING

Syllabus for Semester: II

Syllabus for Undergraduate Programme as per National Education Policy (NEP-2020)

with effect from the academic year

2025-2026

Course/ Paper Title	**Data analysis and forecasting**
Course offered as	**Open elective (OE)**
Course Code	**RUSMAOE201**
Semester	**II**
No. of Credits	**2**
No. of lecture Hours/week	**2**

Sr No.	Course Learning Objectives:
CLO1	to define and explain fundamental statistical concepts, including scatter diagrams, correlation, regression.
CLO2	to apply the Method of Least Squares for curve fitting and regression analysis to analyze real-world datasets.
CLO3	To understand the fundamental concepts of time series data, including components such as trend, seasonality, and randomness.
CLO4	To apply basic index number methods, such as Laspeyres, Paasche, and Fisher indices, to measure economic and business variables over time.

Course Outcomes:

	On completing the course, the student will be able to:
CO1	apply the method of scatter diagram, Karl Pearsons' and Least Squares to find correlation between two variables and fit lines to the given datasets.
CO2	analyze and interpret time series data using descriptive techniques, including moving averages and least squares method
CO3	construct and evaluate index numbers to compare economic indicators and assess price or quantity changes over time.

Detailed Syllabus:

Module	Title with content	No. of lectures
I	**Bivariate Linear correlation and Regression:** Meaning, Types of Correlation, Determination of Correlation: Scatter diagram, Karl Pearson's method of Correlation Coefficient (excluding Bivariate Frequency Distribution Table) and Spearman's Rank Correlation Coefficient. Meaning, Concept of Regression equations, Slope of the Regression Line and its interpretation. Regression Coefficients (excluding Bivariate Frequency Distribution Table), Relationship between Coefficient of Correlation and Regression Coefficients, Finding the equations of Regression lines by method of Least Squares. Use of software (SPREADSHEET) for data analysis.	15 Hours
II	**Times Series:** Concept and Components of time series. Estimation of Trend using Moving Average Method & Least Squares Method (only Linear Trend) Estimation of Seasonal Component using Simple Arithmetic Mean. (For Trend free data only) Concept of Forecasting using Least Squares Method. **Index Numbers:** Concept and uses. Simple and Composite Index Nos. (unweighted, weighted) Laspeyre's Price Index No., Paasche's Price Index No. Fisher's Price Index No., Cost of Living Index No., Real Income, Simple Examples of Wholesale price Index no. (Examples on missing values should not be done) Use of software (SPREADSHEET) for data analysis.	15 Hours

Reference Book:

1. Statistics for Management - Levin R., Rubin D.S. (Prentice Hall of India)

Additional Reference Book:

1. Statistics - Theory, Method & Applications D. S. Sancheti & V. K. Kapoor.
2. Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000
3. STATISTICS by Schaum Series

Royal College of Arts, Science and Commerce

(Autonomous)

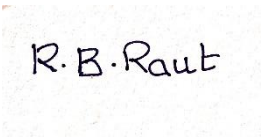
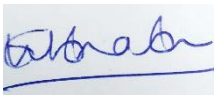
Evaluation Pattern for Open Elective

	Continuous Internal Assessment	
A	One class test	25 marks
B	Assignments/Presentations/Projects	20 marks
C	Attendance	05 marks
	Total	50 marks

Question Paper Pattern (Class test):

Objective (MCQ – 10)	10 Marks (1 Mark each)
Short answer questions (5)	10 Marks (2 Marks each)
Attempt any 1 out of 2 descriptive questions	5 Marks (5 Marks each)
Total	25 Marks
Duration	45 minutes

Board of studies in Mathematics

	Category	Name and Designation	Affiliation	Signature
1	Chairperson (Head of Department)	Mrs Komal Pravin Wategaonkar, Assistant Professor.	University of Mumbai	
2	Full time teacher of the Department	Mrs Rugma Pramod Nair, Assistant Professor.	University of Mumbai	
3	Two subject experts fromoutside the Parent University nominated by the Academic Council.	Dr Ananthnarayan Hariharan, Associate Professor.	I.I.T., Bombay	
		Dr. Amiya Bhowmick, Assistant Professor.	ICT Mumbai	
4	One expert nominated by the Vice-Chancellor froma panel of six recommended by the College Principal.	Dr. Rajesh Raut Assistant Professor, R. D. National college.	University of Mumbai	
5	One expert nominated by the college Principal	Mr. Subhash Krishnan Associate Professor, Vice Principal, K J Somaiya college of Science and Commerce.	University of Mumbai	
6	One representative from industry/corporate sector/allied area relating to placement.	Mr. Arbaz Sayed Data Scientist	Wipro, Hyderabad, Telangana	
7	One postgraduate meritorious alumnus nominated by the Principal.	Ms. Harshita Rathore, Supply Chain Fulfillment Manager,	Microsoft, Austin, Texas, USA