


Curriculum Plan: B. Sc. (H) III (Semester V) SEC: Statistics with R

<p align="center">Mr. Avneesh Kumar Department of Mathematics Kalindi College, University of Delhi, Delhi-110008 Mobile: +91-9810668790 E- mail: avneeshkumar@kalindi.du.ac.in</p>		Marks Distribution	Practical 4P per week	40+40 Marks
		Internal Assessment	Total 40 Marks	
		practical 20 Marks Assignment 20 Marks Attendance		
		Continuous Assessment	40 Marks	

Reference

- Gardener, M. (2018). *Beginning R: The Statistical Programming Language*, Wiley & Sons.
- Sekhar, S.R.M., et al. (2017), *Programming with R*, Cengage Learning India.
- Wickham, H., et al. (2017), *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*, O'Reilly'.
- Field, A., Miles, J and Field (2012), Z. *Discovering Statistics using R (Indian Reprint 2022)*, SAGE.
- Gujarati, D.N. et al (2018), *Basic Econometrics*, McGraw Hill India, 5th Ed.

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Section	Week	Topics
	<i>1st week Aug, 1th – 8th, 2024</i>	Extraction of economics and financial data from Prowessiq, RBI, IMF, World bank or an equivalent financial/economic database. The students should be able to save and export the data to 'R-environment' for further analysis.
	<i>2nd week Aug, 9th – 16th, 2024</i>	Extraction of economics and financial data from Prowessiq, RBI, IMF, World bank or an equivalent financial/economic database. The students should be able to save and export the data to 'R-environment' for further analysis.
	<i>3rd week Aug, 19th – 26th, 2024</i>	Extraction of economics and financial data from Prowessiq, RBI, IMF, World bank or an equivalent financial/economic database. The students should be able to save and export the data to 'R-environment' for further analysis.
	<i>4th week Aug, 27th - Sep 3rd, 2024</i>	Overview of the R language: Installing R and R Studio : Using R studio, Scripts, Text editors for R, Graphical User Interfaces (GUIs) for R, Creating and storing R workspaces, installing packages and libraries, Mathematical operations. Data Types in R – Numeric, Integer, Character, Logical, Complex and missing data
	<i>5th week Sep, 4th – 11th, 2024</i>	Overview of the R language: Installing R and R Studio : Using R studio, Scripts, Text editors for R, Graphical User Interfaces (GUIs) for R, Creating and storing R workspaces, installing packages and libraries, Mathematical operations. Data Types in R – Numeric, Integer, Character, Logical, Complex and missing data
	<i>6th week Sep, 12th – 19th, 2024</i>	Vectors – Creation, Arithmetic operations of Vectors, Vector Sub setting, Sorting and Sequencing functions. Matrix and Arrays – Creation, Arithmetic Operations of matrix, Sub setting, Use of Drop Function. Factors – Converting a vector into factor, assigning levels and labels, ordered Factor
	<i>7th week Sep, 23rd – 30th, 2024</i>	List – Creating a list, accessing elements from a list, adding a new element and eliminating an existing element from the list, converting list to vectors. Data Frames – Creation of Data Frame, adding new columns, rows and removing columns, accessing column using the \$ sign, importing a data set (important file formats such as csv, txt and spreadsheet), aggregate function and subsetting of dataframes, tapply function, manipulation using dplyr package (select, filter, arrange, mutate and group by function, pipe operator)

	8 th week Oct, 1 st - Oct 8 th , 2024	List – Creating a list, accessing elements from a list, adding a new element and eliminating an existing element from the list, converting list to vectors. Data Frames – Creation of Data Frame, adding new columns, rows and removing columns, accessing column using the \$ sign, importing a data set (important file formats such as csv, txt and spreadsheet), aggregate function and subsetting of dataframes, tapply function, manipulation using dplyr package (select, filter, arrange, mutate and group by function, pipe operator)	
	9 th week Oct, 9 th - 16 th , 2024	Programming Fundamentals: Logical operators, conditional statements (if, else, else if statements in R), While loops, For loops, repeat loops.	
	10 th week Oct, 17 th - 24 th , 2024	Creating functions in R. Reading data in R (file formats such as csv, txt, and xls), Writing data to external files (file formats such as csv, txt, and xls), writing a table to a file, print function	
	11 th week Oct, 25 th - Nov 8 th , 2024	Summarizing and exploring data: Descriptive statistics (mean, median, mode, variance, skewness, five-point summary), dealing with missing data in R, Data cleaning (dplyr package, tidyr package and pipe operator), Exploratory Data Analysis; data visualization using inbuilt functions and ggplot2 package (pie chart, bar chart, line chart, histogram, box plot, scatter plot, Normal QQ plot).	
	12 th week Nov, 11 th – 18 th , 2024	Regression analysis using R: Regression vs Correlation, Simple and multiple regression, Ordinary least square, Assumptions of classical normal linear regression model (CNLRM), corrplot package, car package, lmtest package, scatter plot (using plot function and ggplot2 package) to understand the relationship between variables, lm, abline, predict, resid function, interpreting 'summary table' of the regression model, normality of residuals (qqnorm and qqPlot functions),	
	13 th week Nov, 11 nd - 18 th , 2024	multicollinearity (correlation matrix, corrplot and vif function), autocorrelation (acf plot and Durbin Watson test), heteroscedasticity (graphically, bptest, ncvTest), impact on estimates and inferences in case of violations of assumptions of CNLRM, methods to take care of violations	
	14 th week Nov, 19 th - 26 th , 2024	Time series data, components of a time series data, additive and multiplicative time series model, ts function, diff function, plot of a time series data, time series data with linear trend; regression analysis using 'lm' function, stationarity in time series (concept only).	