Shahjalal University of Science and Technology, Sylhet 3114

Institutional Quality Assurance Cell (IQAC)

Topic: Statistical Computing with R for Beginners

Date: August 21-23, 2023; Time: 10 am – 1.00 pm & 2 pm – 5 pm

Day 1	
Session	**Topics**
1	**Getting started with R & R-Studio** - What R is and how it works? - R and R-Studio installation and interfaces - Creating an R-Scripts file and new project directory - Organizing your working directory & setting up R-Studio - Interacting with R on R-Studio - R syntax and Assignment operator - Create objects/variables - Data Types - Explore data types used in R - Construct **data frame** and data structures to store data
2	**Familiarity with data, packages, and built in R-functions.** - Installing & using packages - Import external data set - Inspect data structures in R and basic plotting - Labeling variables, Filtering data, data transformation - Subset data from data frame, coding, recoding variables - Data Transformation, Reshape data, & Merging data sets - Exporting data to the directory.

Day 2	
Session	**Topics**
1	**Analysis of Data** - Descriptive statistics for Categorical variables - Frequency and percentage, pie & bar chart, box plot - Descriptive statistics for Continuous variables - Histogram, density plot, & normality test - One Sample T-Test, Two Independent & Paired sample T-Test - Chi-squared Goodness fit test & Chi-squared test of independence - Correlation Coefficients/heat map - Pearson vs. spearman correlations - Cronbach Alpha/ McDonald's ω (omega) - One way ANOVA & Two-way ANOVA

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Day 2	
Session	**Topics**
2	**Visualization and plotting** - Plotting with ggplot2 - Scatter plot, line graph, pie, bar & histogram, & density plot - box-and-whisker plot, violin plot - A composite graph by compiling several graphs - Dynamic and interactive visualization (basics)

Day 3	
Session	**Topics**
1	**Regression Analysis** - Simple Linear regression and diagnostic checks - Multiple regression model, variables/factor selection criteria, constructing CI - Hypothesis testing with linear restrictions, F-test, & diagnostic checks - Logistic Regression (logit, probit, conditional & multinomial probit) - Regression with dummy variables & categorical factors - Time series analysis in R environment (basics) - Panel data analysis - Export summary results & regression outputs for publication
2	- A data science and data analysis project (in-class drill) - Additional topics as requested by participants. **Basic Machine learning models with R (if time permits)** - An elementary machine learning model for predictive analysis - Function in R, writing user-defined functions in R - Conditional Execution/statements in R - Version control/GitHub - Working with R-markdown/Quarto/Cloud R-Studio

- We will cover the installation and configuration of R and R-Studio. However, we request that you ensure you have R, R-Studio, and R-Tools installed (For Mac users , please see the instructions in https://cran.r-project.org/bin/macosx/) on your laptop prior to attending the workshop.

- Please store all the lectures, data and script files (IQAC-Day1) in your local directory or folder.