VIT CHENNAI

Department of Mathematics, School of Advanced Sciences

Faculty Development Programme on Statistical Modeling, Inference, and Simulation Using R

January 27-31, 2026

Program Schedule

Day 1: Foundations, Data Structures & Exploratory Statistics

Time	Session	Speaker
09:30 – 10:00	Inauguration	30 min
10:00 – 12:00	**Session 1: R Basics, Environment & Data Types** RStudio workflow (console, scripts, projects) – objects and assignment – functions – vectors, matrices, lists, data frames, tibbles – indexing and subsetting; importing/ exporting data (read.csv, write.csv) – handling missing values (NA, na.rm)	Dr. David Raj M
12:00 – 12:30	Discussion & Projects	
12:30 – 14:00	Lunch Break	
14:00 – 15:30	**Session 2: Summary Statistics, EDA & Visualization** Descriptive statistics (mean, median, sd, quantiles) – data inspection (summary, str, head) – apply family (apply, lapply, sapply) – grouped summaries (aggregate) – visualization using base R and introduction to ggplot2 – histograms, boxplots, bar charts – exporting plots	Dr. David Raj M
15:30 – 16:00	Discussion & Projects	

Day 2: Correlation, Regression Basics, and Probability Modeling

Time	Session	Speaker
10:00 – 12:00	**Session 3: Correlation & Simple Linear Regression** Correlation analysis (cor) – simple linear regression using lm – scatter plot with fitted regression line – interpretation of coefficients and R^2 – hypothesis testing on regression coefficients – extracting fitted values and residuals – normal Q-Q plots for residuals – diagnostic plots and assumption checking – normality testing of residuals – homoscedasticity and independence of errors – residual analysis and outlier detection	Dr. Hannah Grace
12:00 – 12:30	Discussion & Projects	
12:30 – 14:00	Lunch Break	
14:00 – 15:30	**Session 4: Probability Distributions & Simulation** Discrete and continuous distributions (Binomial, Poisson, Normal) – d/p/q/r functions – vectorized computation – simulation using rbinom, rnorm, rpois – Monte Carlo simulation – visualization of distributions.	Dr. S Radha
15:30 – 16:00	Discussion & Projects	

Day 3: Multiple Regression and One-Sample Inference

Time	Session	Speaker
10:00 – 12:00	**Session 5: Multiple Linear Regression** Regression with multiple predictors – handling categorical variables using factors – model interpretation (adjusted R^2, p-values) – model comparison using anova – prediction on new data; introduction to multicollinearity concepts	Dr. David Maxim Gururaj
12:00 – 12:30	Discussion & Project	
12:30 – 14:00	Lunch Break	
14:00 – 15:30	**Session 6: One-Sample Hypothesis Testing** One-sample t-tests and proportion tests – confidence intervals – assumption checking using plots – interpretation of test objects (p-value, CI) – writing reusable testing functions	Dr. Devi Yamini
15:30 – 16:00	Discussion & Projects	

Day 4: ANOVA and Non-Parametric Statistical Methods

Time	Session	Speaker
10:00 – 12:00	**Session 7: ANOVA & Model Extension** One-way ANOVA using aov – completely randomized design – post-hoc analysis using TukeyHSD – diagnostic checks – linking ANOVA with regression framework	Dr. M Kaliyappan
12:00 – 12:30	Discussion & Projects	
12:30 – 14:00	Lunch Break	
14:00 – 15:30	**Session 8: Non Parametric Tests** When to use non-parametric methods – Mann–Whitney U test (wilcox.test) – Sign test – Wilcoxon signed-rank test – Kruskal–Wallis test – Friedman test – Tests for randomness – Interpretation of test statistics and p-values.	Dr. M Kaliyappan
15:30 – 16:00	Discussion & Projects	

Day 5: Advanced Hypothesis Testing for Categorical and Paired Data

Time	Session	Speaker
10:30 – 12:00	**Session 9: Two-Sample & Paired Tests** Independent and paired t-tests – two-sample mean and proportion tests – data reshaping concepts (wide vs long) – effect size interpretation – visual comparison using boxplots	Dr. Devi Yamini
12:00 – 12:30	Discussion & Projects	
12:30 – 14:00	Lunch Break	
14:00 – 15:30	**Session 10: Chi-Square Tests** Goodness-of-fit and independence tests – contingency tables using table() – expected frequencies and residuals – visualization of categorical relationships	Dr. R. Pavithra
15:30 – 16:00	Discussion & Projects	

Coordinators:
Dr. Manivannan A, Associate Professor & Head, Department of Mathematics, SAS
hodcc.mdt@vit.ac.in; manivannan.a@vit.ac.in

Dr. Kaliyappan M, Professor, Department of Mathematics, SAS
kaliyappan.m@vit.ac.in