Module Code:	STAT-319
Module Title:	Advanced Computer Languages – 3 credit Hours
Name of Scheme:	BS Statistics

Learning Outcomes

By the end of this course, students will be able to:

1. Get familiar with the interface of R along with the objects required for the purpose of data analysis.
2. Learn the basic programming skills including logical statements, looping and graphical functions.
3. Generate random numbers and simulate data from different distributions.
4. Estimate Regression and Time Series models based on Monte Carlo Simulations and Bootstrapping.

Course Outline

1.1 Introduction to R and its Framework

Downloading, Installing and Starting R and associate libraries. Calculating environment of R, Types of R objects, Vector, Matrix, Data frame, Array etc. Writing Scripts, Basic programming skills, Logical statements, Looping, Programming flow and basic debugging. Using built-in functions, Input and Output files, Programming with functions, Graphics.

2.1 Empirical Study of Sampling Distributions

Probability and probability distributions, Generating random numbers, Selecting random samples, Empirical study of the sampling distribution of estimators.

2.2 Data Simulation

Simulation of data from a probability distribution, Simulation of data for a regression model, Simulation of data for time series model, Monte Carlo simulation, Bootstrapping.

Text Book

1. Lander, J.P. (2017). R for everyone: Advanced Analytics and Graphics, 2nd edition. Pearson Education Inc. New York.
2. Purohit, S. G., Gore, S. G., & Deshmukh, S. R. (2008). *Statistics Using R*. Narosa Publishing House

Suggested Readings:

1. Fischetti, A. (2018). Data Analysis with R: A comprehensive guide to manipulating, analyzing and visualizing data in R. Packt Publishing Ltd.
2. Jones, O., Maillardet, R., & Robinson, A. (2014). Introduction to scientific programming and simulation using R. Chapman and Hall/CRC.