

A distance learning course in Basic Applied Statistics with R

Course Lecturer: Dr. Alan Kelly, Associate Professor of Biostatistics in the Department of Public Health & Primary Care, Trinity College Dublin.

Course Aim: To provide a clear, practical, focused and 'hands-on' introduction to applied statistics.

Who should take this course?

This course is intended for those presently engaged in, or intending to undertake data analysis relating to research in the health or life sciences.

Prerequisites:

No previous knowledge of biostatistics is assumed. You must have access to a computer, email and Acrobat Reader. All analyses and exercises will be conducted using the freely downloadable statistics package R (<http://www.r-project.org/>). Instruction will be provided in installing and using R.

Delivery:

Notes and assignments for each of the six modules will be available for download from the course website. One or more example data sets for illustration and self-testing will accompany the modules. Participants are strongly encouraged to complete the assignments and submit these to the course lecturer for assessment. Sample answers will be provided. After registration, participants will be issued with a name and password to access the web site. A certificate of course completion will be awarded to participants who submit the assignments. Places are strictly limited. For an application form please email the course manager Marlen Carvalho (mcavalho@tcd.ie)

Basic Applied Statistics with R – Course Outline

Modules

1. Introduction to R
 - 1.1 Why R?
 - 1.2 Download and install R
 - 1.3 The interface
 - 1.4 Basic calculations
 - 1.5 Importing data from Excel
 - 1.6 Simple graphics
 - 1.7 Saving results
 - 1.8 Summary of R commands

Review exercises and assignment 1

2. Describing data
 - 2.1 Data typology
 - 2.2 Categorical and Numerical data
 - 2.3 Averages - measures of centre
 - 2.4 Spread – measures of variation
 - 2.5 Working with tables
 - 2.6 Adding additional packages to Base R
 - 2.7 Summary of R commands

Review exercises and assignment 2

3. Comparing groups (I)
 - 3.1 Introduction to parametric and non-parametric tests
 - 3.2 Sampling distribution of the mean and the standard error
 - 3.3 Hypothesis tests and Confidence Intervals
 - 3.4 Two-groups: Paired samples
 - 3.5 Two-groups: Independent samples
 - 3.6 Summary of R commands

Review exercises and assignment 3

4. Comparing groups (II)
 - 4.1 Introduction – comparing multiple groups
 - 4.2 Analysis of variance - ANOVA
 - 4.3 Nonparametric method - Kruskal-Wallis test
 - 4.4 Summary of R commands

Review exercises and assignment 4

5. Comparing groups (II) – categorical data
 - 5.1 Introduction – frequency tables
 - 5.2 One proportion
 - 5.3 Two or more independent proportions
 - 5.4 Two paired proportions
 - 5.5 Analysis of tables - the chi-square test
 - 5.6 A 2 x 2 table
 - 5.7 A 2 x k table
 - 5.8 A k x k table – matched variables
 - 5.9 Estimating risk - relative ratio and the odds ratio
 - 5.10 Analysis of Large tables
 - 5.11 Summary of R commands

Review exercises and assignment 5

6. Assessing association - correlation and simple linear regression
 - 6.1 Pearson's correlation coefficient
 - 6.2 Spearman's nonparametric correlation
 - 6.3 Simple regression models
 - 6.4 Multiple regression
 - 6.5 Summary of R commands

Review exercise and assignment 6