Introductory Course on Statistics:
Data Visualization and Analysis Using R
(14 hours)

Date: 12th, 17th, 19th, 24th, 26th, 31st October 2018; 2nd November 2018
Time: 5.30-7.30pm
Venue: University Residence, Robert Mifsud Bonnici Street, Lija (ample parking space available).
A certificate of attendance will be awarded to participants on completion of the course.

Registration Fee: €175
University Student Fee: €155

Requirement: Attendees will need to bring their laptops to the sessions.

Aim and contents of course:

This course is targeted to individuals who are not familiar with basic statistical concepts or individuals who have attended some basic course in Statistics but would like a refresher course and perhaps even learn more than was covered in their previous education and/or training.

The aim is to provide a painless introduction to statistical analysis to users with a non-mathematical background. The software that will be used in this course is R. R is a very widely used software in the statistical community due to it being very powerful and available for free download. Apart from standard tasks, the open source platform also allows one to freely download, install and use additional packages.

Course outline:

(1) The Importance of Statistics and Data Analysis in Today's World
(2) Getting Acquainted with R and the R Studio Interface
(3) An Introduction to Different Types of Variables
(4) Data Exploration and Visualisation using R - looking at the most common statistical and visual techniques for preliminary data analysis
(5) Basics of Sampling - introducing fundamental concepts on sampling, including important tools such as margin of error and sample size calculation
(6) Tests for correlation, association and comparison of means - parametric and non-parametric tests, when and how to use them within R.
(7) Introduction to statistical modelling: regression analysis.

Learning outcomes:

After following this course one becomes more knowledgeable about:
● Different summary statistics and data visualization tools.
● Basics of statistics: such as random variables, sample space, sampling distributions and their importance.

- The different ways of conducting statistical inference: calculating point estimates, margin of error and testing different hypotheses.
- The general idea behind statistical modelling techniques such as regression analysis.

Skills learnt:
- Summarizing important properties and relationships in a data set.
- Identifying a proper sample size to use for a study and measuring the uncertainty within a sample.
- Using R software to conduct popular statistical tests such as t-tests, Chi-Squared tests of association between two categorical variables, correlation analysis, and their non-parametric equivalents.

Delivery style: Lectures and hands-on use of R software

Course Tutors: Dr. Monique Borg Inguanez, Dr. Fiona Sammut, Dr. David Suda

Dr Monique Borg Inguanez, Dr Fiona Sammut and Dr David Suda are all lecturers with the Department of Statistics & O.R. at the University of Malta, and have a long standing experience, of more than 10 years, in teaching Statistics to students at different levels. Furthermore, they have also provided their statistical expertise to people in various sectors such as government authorities, medicine, market research, economics and various scientific fields. The three lecturers obtained a BSc (Hons) in Maths & Statistics & O.R. from the University of Malta followed by an MSc in Statistics also from the University of Malta. Further studies were then pursued in renowned universities in the UK. Dr Monique Borg Inguanez obtained a PhD in Statistics from the University of Leeds, where she conducted research on partial least squares and related methods. Dr Fiona Sammut obtained a PhD in Statistics from the University of Warwick, where she conducted research on compositional data analysis. Dr David Suda obtained a PhD in Statistics from the University of Lancaster, where he conducted research on statistical inference of diffusion processes.

Certification:

Participants who attend at least 80% of the sessions will be awarded a Certificate of Attendance issued by Malta University Consulting Ltd.

Contact information:

Cheques are to be made payable to Malta University Consulting Ltd

For further information kindly contact: Malta University Consulting Ltd, Robert Mifsud Bonnici Street, Lija.

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Course Programme

Each session is 2 hours long

Session 1

- The Importance of Statistics and Data Analysis in Today's World.
- Getting Acquainted with R and the R Studio Interface.
- Importing, Creating and Sorting data in R.

Session 2

- An Introduction to Different Types of Variables.
- Descriptive Statistics - Mean, trimmed mean, median, standard deviation, variance, skewness and kurtosis.
- Data Exploration and Visualisation - looking at the most common statistical and visual techniques for preliminary data analysis these include:
  - Pie Charts
  - Bar Graphs
  - Histograms
  - Box-plots
  - Scatter plots.

Sessions 3 - 5

- Basics of Sampling
  - introducing notions such as population, sample, sample space and sample estimates
  - introducing important probability distributions
  - investigating the relationship between population and sample
  - calculating the margin of error
  - sample size calculation.

- Tests for comparison of means:
  - one-sample, independent and paired samples t-test
  - one-sample and paired Wilcoxon tests, Mann Whitney test
  - ANOVA and repeated measures ANOVA
  - Kruskal-Wallis and Friedman test
  - Post-hoc tests.

Session 6

- Tests for comparison of proportions.
- Tests for association: Chi-squared test.
- Tests for correlation: Pearson, Spearman and Kendall tests.
- Introduction to modelling.

Session 7

- Hands-on supervised experience with real data - visualisation and analysis.