

Statistics for Engineers 2019

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**Aim:** The course is an introduction to statistical methods most frequently used for experimentation in Engineering.

Lectures are planned both in the classroom and in computer lab also for an introduction to the use of the following statistical software:

- R
- MINITAB (licensed to University of Padova)
- NPC TEST

### **Topics:**

**1. Elements of univariate statistical methods:** Elements of descriptive statistics: frequency, indices of synthesis (position, variability and shape) and graphical representations (histogram, boxplot, scatterplot).

Elements of probability theory: discrete and continuous probability distributions.

Elements of statistical inference: sampling distributions, point and interval estimation, hypothesis testing, One-way ANOVA, Multi-Way ANOVA, Factorial Designs.

**2. Statistical Modelling:** Experiments and observational studies, regression, residuals versus error terms, standard errors, generalized least squares, normal theory of regression, the F-test, path models, inferring causation from regression, multivariate regression and logit models, latent variables, nonparametric tests.

### **MAIN REFERENCES**

1. Stark, P.B., 1997. SticiGui: Statistics Tools for Internet and Classroom Instruction with a Graphical User Interface.
2. Montgomery DC, Design and Analysis of Experiments, 2010, Wiley.
3. Lattin J, Carroll JD, Green PE, Analyzing Multivariate Data, 2003, Duxbury Applied Series.
4. Johnson RA, Wichern DW, Applied Multivariate Statistical Analysis, 1998, Prentice Hall; 4th edition.
5. Hollander and Wolfe, Nonparametric Statistical Methods, 2nd edition, 1999, Wiley Series in Probability and Statistics.
6. Shumway RH, Stoffer DS, Time Series Analysis and Its Applications (With R Examples), 2nd Edition, 1998, Springer Texts in Statistics, New York.
7. **Adhoc material by Lecturer.**

**Time table:** Course of 36 hours. In year 2019 (if funded) it will take place as a Summer School in Bressanone (BZ), July 8-12, 2019 (grants will be provided to cover expenses for all participants). Alternatively, it will take place in February 2019 (6 days of 6 hours each, dates to be defined).

**Course requirements:** no prerequisites.

**Examination and grading:** Final evaluation will be based on a personal report and related discussion based on a case study within the individual PhD project.