TOPICS

SPECIFIC TOPICS

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
- Statgraphics (licensed to University of Padova)
- NPC TEST

GENERAL 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.
Main Reference: Stark, P.B., 1997. SticiGui: Statistics Tools for Internet and Classroom Instruction with a Graphical User Interface

2. **Statistical Modelling:** Experiments and observational studies, regression, residuals versus error terms, matrix algebra, standard errors, generalized least squares, normal theory of regression, the F-test, path models, inferring causation from regression, response schedules, types of variables, maximum likelihood, probit and logit models, latent variables, the bootstrap for estimating bias and variance.

MAIN REFERENCES

1. Montgomery DC, Design and Analysis of Experiments, 2010, Wiley.
2. Lattin J, Carroll JD, Green PE, Analyzing Multivariate Data, 2003,Duxbury Applied Series.
3. Johnson RA, Wichern DW, Applied Multivariate Statistical Analysis,1998, Prentice Hall; 4th edition.
4. Hollander and Wolfe, Nonparametric Statistical Methods, 2nd edition, 1999, Wiley Series in Probability and Statistics.
5. Shumway RH, Stoffer DS, Time Series Analysis and Its Applications (With R Examples), 2nd Edition, 1998, Springer Texts in Statistics, NewYork.
6. **Adhoc material by Lecturer.**

EXAMINATION

Attendance is required for at least 2/3 of the lecture hours.
Final evaluation will be based on the discussion of a case study within the individual PhD project.