Addinsoft
40 rue Damrémont
75018 Paris
Email: training@xlstat.com
Tel: +33(0)170060488 / (646) 412 3348

ADDINSOFT DATA SCIENCE MADE SIMPLE

ANOVA AND REGRESSION MODELS

This course is intended for people who want to master the ANOVA and linear regression statistical methods.
The ANOVA component will focus on:

- One-wayANOVA
- Multi-factor, balanced ANOVA
- Repeated measures ANOVA

The regression part will be mainly devoted to simple regression.
The course is suitable for people who are looking to:

- Understand howANOVA et regression work
- Apply these methods on their own datak
- Interpret XLSTAT outputs from these types of analyses

The course will spend ⅔ of the time on ANOVA and ⅓ on regression.

Duration: 21 hours (3 days)
Location: The course is available in-person at your premises or online via videoconference.
Price (excluding VAT) :

- Inter-company online training : n/a
- Intra-company online training : $5750,00 per training
- Intra-company on site training : $5750,00 per training + trainer's travel expenses

Trainee profiles:

- Anyone interested in using analysis of variance and regression methods
- Technicians – Employees – Executives – Researchers – Students

Required experience:
Trainees must have a good knowledge of basic statistical tools:

- Descriptive statistics
- Hypothesis testing
- Confidence intervals
- P-value
- Alpha risk

Training objectives

- Verify the assumptions of a one-way and multi-factor ANOVA.
- Understand how ANOVA works
- Interpret the results of an ANOVA model
- Carry out a post-hoc test (Tukey, Bonferroni, Dunnett, etc.)
- Interpret interaction effects
- Understand how repeated measures ANOVA and nested factor ANOVA work
- Carry out a repeated measures ANOVA on a balanced design

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- Understand how multiple regression works
- Implement a simple linear regression model
- Understand the differences between regression and ANOVA

Syllabus

- Review of basic statistical tools
  - Writing conventions on samples ($\bar{x}$, s, …) and populations (μ, σ, …) (, s, …)
  - Confidence intervals
  - Hypothesis testing
  - The p-value

- Implementation and interpretation of a one-way ANOVA
  - The context for using the simple ANOVA
  - Differences with the Student Test
  - Independent and paired data
  - Assumptions for ANOVA
  - Variance decomposition
  - Interpretation of the ANOVA table
  - Experimental error
  - Significance of effects
  - Reading the Fisher table
  - The importance of degrees of freedom for the error term
  - Multiple comparisons of means
  - Post-hoc tests (Tukey, Bonferroni, Newman-Keuls, ...)
  - Common mistakes to avoid in ANOVA

- Implementation and interpretation of a two-way or multi-factor ANOVA
  - Context for using a two-factor ANOVA
  - The concept of interaction terms
  - Assumptions for implementing a two-factor ANOVA on balanced and unbalanced designs
  - Decomposing the variance
  - Interpreting the ANOVA table: the different sums of squares (type I and III), calculating the error, significance of the effects, significance of the interaction
  - Multiple comparisons of means: the various tests (Tukey, Bonferroni, Dunnett, etc.)
  - Graphical output of the model

- The different experimental designs and associated models
  - Presentation of the linear model
  - The different types of factors
  - The different types of models:
    - Models with and without interactions
    - Crossed and nested models
    - Repeated measures
  - The importance and pertinence of the experimental design

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- Implementation and interpretation of a simple linear regression
  - General principles of regression:
    - Differences between ANOVA and regression
    - The objective of linear regression
    - The assumptions
    - Basic principles of regression modeling
  - The different models of regression: simple and multiple linear model
  - Model quality: error of estimation, coefficient of determination
  - Residual analysis:
    - Residual computations
    - Homogeneity
    - Suspect values
    - Graphical analysis
  - Using the model: prediction of individual values, confidence intervals of the predictions
  - Graphical representation of the results
  - Common mistakes to avoid in regression
  - Introduction to multiple regression

Training organization

Teaching staff:

- **Thierry Anthouard** is the head of the Arkesys Group's statistical training program and has always been passionate about the field of statistics. In 1992, he launched the development of the Arkesys Group's statistics training program. His "by example" pedagogical approach allows him to popularize statistics and to make it accessible to all learners. As a consultant supporting key accounts, he adapts to all types of contexts and learning issues.
- **Jérôme-Philippe Garsi** is a statistical instructor with 13 years of experience in the training field. Since his doctorate on clinical issues, his work is mainly focused on the interest of populations, their health and well-being. At ease with any audience, he makes pedagogy and the simplification of scientific knowledge a priority. To do so, he always takes the greatest care to be clear in his written documents as well as in his oral presentations.

Teaching techniques:

- Trainees are welcomed in a dedicated classroom.
- Theoretical explanations followed by guided practice and independent learning
- Supporting documents will be posted online after the course
- Complimentary exercises can be loaded onto a USB key

Follow-up: evaluating training participation and results

- Attendance sheets
- Review and evaluation exercises

- Evaluation at the end of the course
- Certificate of completion of the training course

Accessibility for disabled people:
People with disabilities who wish to take this course can contact us directly so we can examine together the best way to proceed.

Amount of time the course materials will be available before it starts: 2 weeks

Online training: The link to the virtual classroom will be sent by email the week before the course starts.

Contact: For further information you can contact us by email at: training@xlstat.com or by phone at (646) 412 3348.