

# TRAINING IN STATISTICS APPLIED TO FIELD RESEARCH



**Data-driven decisions, fundamental to  
increase quality, productivity, and make it  
sustainable over time**

| 2021

## ❖ Course details

---

Title: Training in Statistics applied to field research.

Level: Intermediate.

Mode: Presential / online.

Duration: 12 hours spread over 2 days.

## ❖ Objectives

---

By the end of the course, attendees will have covered the training needs in the field of R&D of new products.

- Have a deep understanding of all the phases of a field investigation and a comprehensive vision.
- Spread the use of good practices during the design of an investigation and in the subsequent phases.
- Introduce the student in the programming language and free software environment for statistical computing R, and the jamovi program, for data analysis.
- Guide in the interpretation of the results for the subsequent decision-making process.

## ❖ Contents

---

### Module I: From the stable to the table

Presentation of the problem and considerations for the development and performance of a study.

### Module II: Protocol and design

*Examples for every of the following points*

- Study objectives, types of variables and hypotheses of the experiment.
- Experimental design
  - *Planning phases of an investigation and protocol components.*
  - *Study population (internal and external validity and incorporation of study subjects: inclusion and exclusion criteria).*
  - *Estimation and calculation of the sample size.*
  - *Reduction of bias (randomization and blind tests).*
  - *Intervention (description and scheme, measurement).*
  - *Calendar of activities, monitoring and measurements.*
  - *Evaluations of the variable response (collection, monitoring and quality control).*
  - *Configuration of the study (parallel, crossover, factorial).*
  - *Bad practices and costs of a bad design.*
  - *Additional information.*
- Data preparation, management, and practical recommendations from its collection to the creation of a database ready to analyze.
  - *Guidelines for naming variables, organization and data entry, coding, validation rules, double entries, types of errors, premises, checks, missing values, data array errors, procedure for debugging data and locating errors, values 0, ...*
- Organization of a trial (researchers, monitors, statisticians, and rest of the personnel involved).

### Module III: Data analysis

- Introduction and analysis with R.
- Description of the data, graphs, relations between variables, SD, mean error, ...
- Hypothesis for ANOVA and other parametric tests: normality, homogeneity.
- Transformations.
- Comparison of means of independent data, paired data, proportions, ...
- Linear models.
- Variability, numerical chaos, and Statistical Process Control (SPC).
- Jamovi program: Introduction and use to analyze production data.

### Module IV: Interpreting results

- Presentation of results and interpretation to make decisions based on evidence.
- Key concepts.
- Biological relevance.

## ❖ Methodology

**Oral presentations:** The course contents will be taught by a professor expert in the sector, who will complement the slides that will be given to the students with theoretical and practical explanations, facilitating their understanding and expanding the scope of the learning.

**Practical exercises:** During the sessions, the students will solve practical cases that may face daily, which will give them the possibility to extrapolate the knowledge acquired to their activity in the company. An additional professor will be reviewing the work of each student individually, accompanying, guiding, and solving any doubt with the necessary explanations.

**Discussion groups.**

## ❖ Professors

Name and surnames	Education	Contact
<b>Morillo Alujas, Alberto</b>	PhD in Veterinary and Statistician	<a href="mailto:a.m.alujas@testsandtrials.com">a.m.alujas@testsandtrials.com</a> +34 974 416 469
<b>López Cano, Emilio</b>	PhD in Statistics	<a href="mailto:emilio.lopez@urjc.es">emilio.lopez@urjc.es</a> +34 914 888 506
<b>Villalba Mata, Daniel</b>	PhD in Agricultural Engineer	<a href="mailto:daniel.villalba@udl.cat">daniel.villalba@udl.cat</a> +34 973 702 556
<b>Nadal Zuferrí, Sergio</b>	PgDip in Statistics in Health Science	<a href="mailto:snadal@testsandtrials.com">snadal@testsandtrials.com</a> +34 974 416 469