

Experimental design laboratory STS 496

Purpose/Goals:

This course will provide students with a review of basic statistical concepts as well as in depth coverage of multivariate statistical procedures. Students will have the opportunity to gain practical experience with the analysis of experimental data using SPSS. Several different designs and procedures will be covered. Expertise in statistics comes with practice and experience. The goal here is to learn the fundamental principles and basic techniques, which will allow the learning process to begin.

Specific topics to be covered will include further confounding and fractional replication, analysis of covariance, analysis of variance of complex nested and cross classification. Incomplete block design and response surface methodology.

SPSS sessions

The SPSS sessions aim to introduce students to the Statistics Package for Social Sciences (SPSS) and to provide with some practical experience in how to:

- fill in data
- perform descriptive statistics
- calculate t-test and ANOVA for different types of experimental designs
- interpret output

Lab 1 – Introduction to SPSS

Presentation of when SPSS is used and of its components (data editor, output viewer and syntax editor). Practical exercises in how to:

- define variables
- fill in data
- import data from a text file
- manipulate data in order to create new variables
- perform descriptive statistics
- create a bar chart

Lab 2 – t-test for independent groups

Revision of descriptive statistics for independent groups design (L1). Presentation of Independent-samples t-test. Practical exercises in how to:

- perform t-test on data from an independent groups design
- interpret the result in output viewer

Lab 3 – ANOVA for independent groups and repeated measures

Presentation of One-way ANOVA and how data are entered differently depending on the experimental design (between groups or within groups design). Practical exercises in how to:

- perform ANOVA on data from an independent groups design
- perform analytical comparisons with One-way ANOVA
- interpret the result in output viewer
- fill in data from a repeated measures design
- perform descriptive statistics and create bar charts for repeated measures

Lab 4 – ANOVA for repeated measures

Presentation of Paired-samples t-test and Repeated measures ANOVA. More detailed presentation of the syntax editor. Practical exercises in how to:

- perform t-test on data from a repeated measures design
- perform ANOVA on data from a repeated measures design
- perform analytical comparisons with Repeated measures ANOVA in syntax editor
- interpret the result in output viewer

Lab 5 – ANOVA for complex designs

Presentation of how to fill in data from complex designs (i.e. designs with more than one independent variable) and of GLM: Univariate. Practical exercises in how to:

- get descriptive statistics and make bar charts for complex designs
- create a line graph in order to study possible interaction effects
- perform ANOVA (GLM, General Linear Model) on data from a complex design with between groups variables
- interpret the result in output viewer

Lab 6 – ANOVA for complex designs (cont.)

Revision of ANOVA for complex designs (L5). Presentation of simple main effects and simple comparisons in GLM: Univariate. Practical exercises in how to:

- determine, from the tables in output viewer, whether there is an interaction effect or not in the current experiment
- perform analyses of simple main effects and simple comparisons in syntax editor
- interpret the result in output viewer