Module Title:

Statistical Decision and Analysis of Variance

Module Code:

DA0104

Maximum Number of Students:

25

Total ECTS Credits

2

Notional Learning Hours
(a) Contact Time - 15 h
(b) Private Study - 35 h

Format of Teaching:

Lectures	10 h
Laboratories or Practicals	0 h
Other	5 h

Teaching Strategy:

10 h of formal lectures in 60-120 min timetable.
5 h of exercises in computer seminars (with Excel spreadsheet)

Convener:

Martí Rosés

University / Department:

Universitat de Barcelona / Departament de Química Analítica

Language of Tuition:

English

Module Description - The Purpose or Aims:

To introduce the fundamentals and importance of statistical decision
To evaluate the different sources that contribute to data variability
To differentiate between random and controlled factors that contribute to data variability
To apply statistical tests and analysis of variance to design and validate analytical methods

Specific Learning Outcomes for this module: (contributing to general learning outcomes GLO 1 – GLO 10)

At the end of the module, the learner is expected to be able to apply statistical decision test and analysis of variance to:

Development and evaluation of a quality control scheme for a given type of measurement (GLO2)
Validation of new techniques and methods of analysis (GLO4)
Planning of validation programs for a given method of analysis (GLO5)
Identification of critical aspects in a given method of analysis (GLO6)
Organization and evaluation of Collaborative Studies (GLO9)
Comparison of analytical results (GLO10)

Summary of Course Content:

This module will discuss the fundamentals and applicability of statistical decision tests: comparison of a mean to a reference value or comparison of two means (z-tests and t-tests, including paired t-test), comparison of variances (F-test), comparison of distributions (chi-square tests) and discard of outliers (Q-test). It will also discuss the fundamentals, applications and limitations of the analysis of variance. This will include the use of one-way and two-ways ANOVA in the analysis of data variability caused by different sources, experimental design and interlaborary tests.

Transferable Skills Taught:

Ability to take decisions
Ability to use computers

Assessment Methods:

All outcomes (GLO2, GLO4, GLO5, GLO6 and GLO10):

1. Written examination (80%)
2. Computer and written assignment (20%)

Assessment Criteria:

Threshold:
To select the appropriate statistic tests or analysis of the variance procedures to solve specific analytical problems

Good:
To correctly apply the appropriate statistic test or analysis of the variance procedure to solve specific analytical problems

Excellent:
To extract the analytical information desired to solve specific analytical problems from the application of the appropriate statistic tests or analysis of the variance procedures. Present a very good discussion of: the selection of the statistic procedures, their advantages and limitations over other possible ones, and the reasoning used to reach the information required.

Resource Implications of Proposal and Proposed Solutions:

Lecture notes will be available to students
Microsoft Excel required for the computer seminars
Recommended reading:
- J.N. Miller and J.C. Miller: 'Significance tests', chapter 5 in "Statistics and Chemometrics for Analytical Chemistry". 4th ed. Prentice and Hall, 2000.
- D.C. Harris: 'Statistics', chapter 4 in "Quantitative Chemical Analysis". 6th ed. W.H. Freeman & Co., 2003.

Pre-Requisites: