63003 - Statistical techniques, experimental design and modelling

Información del Plan Docente

Academic Year	2016/17
Academic center	105 - Facultad de Veterinaria
Degree	566 - Master's in Food Quality, Safety and Technology
ECTS	6.0
Course	1
Period	First semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

5.3.Program

There are two modules: Module I: Statistical techniques, and Module II: Design of experiments and modeling.

63003 - Statistical techniques, experimental design and modelling

1: Module I . **Statistical techniques.**

Unit 1: Kind of variables and measurement scales. Quantitative and qualitative variables. Discrete and continuous variables. Appropriate measures.

Unit 2: Probability distributions. Probability. Random variable: types and classification. Probability distribution of a random variable. Discrete and continuous distributions in the field of food science and technology. Other fundamental distributions for statistical inference.

Unit 3: Conditional probability. Definition of independent random variables. Bayes Theorem.

Unit 4: Frequency. Frequency Tables. Frequency tables for grouped and ungrouped data. Graphical Representation of Frequency Distribution.

Unit 5: Descriptive statistics. Descriptive measures for a sample data. Moments measures (central tendency, variability and shape), and position measures (percentiles).

Unit 6: Sampling. Basic concepts of sampling. Characteristics of the sample. Factors to consider: sampling method and sample size. Types of sampling errors. Production mechanisms of slant and sampling errors. Sampling methods: probability and non-probability methods. Factors influencing sample size. Calculation of sample size (to detect disease, to estimate the mean, to estimate percentage and percentage differences).

Unit 7: Statistical Inference I: confidence intervals. Definition of statistical inference. Sampling distribution of a given statistic based on a random sample. Obtaining a probability interval from the sampling distribution. Confidence intervals. Calculation of the confidence intervals most representative or used in the food industry.

Unit 8: Statistical Inference II: statistical hypothesis test. Definition of hypothesis test. Basic elements in a Test. Types of errors. The significance level. P-value concept.

Unit 9: Statistical Inference III: selection of the statistical test. Types of hypothesis testing. Parametric and nonparametric tests. The most commonly hypothesis tests used in statistical inference with application to the food industry.

63003 - Statistical techniques, experimental design and modelling

2: Module II. Design of experiments and modeling.

Unit 10. Experimental design. Introduction. Definitions and objectives of the experiment desing. Drawbacks of the traditional methods of experimentation. Statistical design of experiments. Factorial design. Response Surface Design: Box-Berken design, central composite design, Doehlert design.

Unit 11. Analysis of experimental data. Objectives. Analysis of systematic and accidental errors. Accuracy and precision. Graphical methods to show variability.

Unit 12. Modelling. Definitions. Terminology. Linear and nonlinear regression. Evaluation of the goodness of fit. Comparing models. Validation. Predictive Microbiology: primary, secondary and tertiary models.

Unit 13. Experimental design. Software management for statistical experimental design: Design-Expert. Exercises.

Unit 14. Data analysis. Software management for data analysis: Prism, Excel. Exercises.

Unit 15. Modelling. Software management for data modeling: Prism, Excel. Development of primary, secondary and tertiary models. Models of interest in Food Science and Technology (growth and microbial inactivation, sorption isotherm, dehydration curve, enzyme kinetics). Software management and Web sites related to predictive microbiology: PMP (Pathogen Modeling Program), Combase, Seafood Spoilage Predictor Software, Growth Predictor.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources