	MSc Program: Advancements in Food Sciences and Biotechnologies **MSc in Food Safety and Biotechnology** Department of Biotechnology and Food Science Faculty of Sciences University of Burgos
Universidad de Burgos	

COURSE	CODE
TITLE: Chemometrics and Qualimetrics in food	7441

Tuition Period (semester)	Duration (in months)	Type (Mand/Op)	ECTS Credits	Hours (theoretical)	Hours (practical)	Hours (other activities)
Semester 1	1	Op	4			

LECTURER IN CHARGE OF COURSE (1)

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LECTURER (4)

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3.3.1. SPECIFIC EDUCATIONAL OBJECTIVES

OBJECTIVES:

1. To understand the need of methodological approaches to carry experiments, and to operationally handle the tools of experimental design to pose and solve problems (in both scientific research and industrial application)

2. To understand the basics of two- and three-way regression methods, and to fit highly predictive models.

3. To be aware of the quantitative possibilities of the hyphenated instrumentation coupled with multi-way calibration methods, identifying the situations in which multi-way methods can be useful.

4. To handle two or higher order signals for PAT (process analytical technologies)

5. To be able to apply and interpret, in the terms of the data being studied, a PCA (principal component analysis) for multivariate data

6. To differentiate between discriminating and class-modelling methods, correctly handling the sensitivity and specificity specially associated to typification/authentication/characterization of food products

7. To understand and correctly apply analysis of variance (ANOVA) for one or several factors and their interactions.

COURSE PROGRAMME SUMMARY:

THEORETICAL AND PRACTICAL SESSIONS:

Topic 1: Analysis of variance (ANOVA). One-way and multi-way analysis of variance. Nested models. Application to characterization of food products

Topic 2. Multivariate techniques for exploration and classification of data: Principal Components Analysis (PCA), Linear Discriminant Analysis (LDA), Soft Independent Models of Class Analogy (SIMCA). Pre-treatment, interpretation, selection of variables, sensitivity and specificity. Application for detecting frauds in food, for typification of liquors, for detection of storage procedures, etc.

Topic 3: Multivariate regression methods. Multilinear regression methods (MLR), and methods based on latent variables (PLS) extended for multi-way data. Application for instrumental data coming from NIR, MIR, GC-MS, electronic noses, etc.

Topic 4. Experimental design. Screening designs, factorial designs, response surface methodology for optimising one or several responses (desirability functions).

3.3.2. TEACHING METHOD:

Learning Activities

Learning activities are designed to be as close to the real application as possible. To that end, all the sessions are taught in a computer laboratory, where a topic is introduced to immediately be discussed and practiced with real data sets and professional software.

ECTS credit allocations (Approximate Student workload in hours):

		Hours
Classroom	Lectures / Directed discussions	8
	Practical Classes (and laboratory notebook compilation)	18
	Seminars and tutorials:	4
	Essays - Presentations	2
	Assessment Tests	4
	On Site - Total Hours:	36
Off campus	Workload to prepare theoretical and/or practical classes	15
	Resolution of exercise, practical cases and questionnaires	30
	Workload to prepare exams and/or evaluation tests	4
	Workload for writing reports on real problems posed in the classroom	15
	Off-Campus - Total Hours:	64
	WORKLOAD - TOTAL HOURS:	100

3.3.3. ASSESSMENT CRITERIA AND METHOD

Continuous assessment.

After finishing each topic, there is a brief on-site individual test and a problem is posed with real data for the student to write a report about.

3.3.4. LEARNING RESOURCES

Human resources:

The teachers

Material resources:

A computer laboratory room with computers with the necessary software (in English), most of it can also be installed by the student in his/her own computer to work off-campus.

Materials used in the classroom as well as additional references, in English.

3.3.5. CLASSROOM LANGUAGE

Spanish