SUBJECT GUIDE **Academic year 2015-2016**

PRINCIPLES OF INSTRUMENTAL TECHNIQUES IN NUTRITION

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Complements of Formation	PRINCIPLES OF INSTRUMENTAL TECHNIQUES IN NUTRITION	3º	2º	6	OPTATIVE

lecturer	Address
José Manuel Paredes Martínez	Department of Physical Chemistry University of Granada Cartuja Campus 18071, Granada (SPAIN) Tel. +34 958 243829 Fax. +34 958 244090 E-mail: jmparedes@ugr.es,
	TUTORSHIPS
	Crovetto González, Luis Monday: 12'00-14'00 h (Room 198) Tuesday: 12'30-14'30 h (Room 198) Thursday: 12'30-14'30 h (Room 198)

DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT	
Human Nutrition and Dietetics	

BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE)

Objectives

• To learn modern those analytical techniques mostly used in food analysis to separate, detect and quantify food components, residues and contaminants. To know the new trends in food analysis.

DETAILED SUBJECT SYLLABUS

U. 1. Presentation of subjecU.
Objectives, Information and organization. Evaluation. Bibliography.
U. 2. Introduction of technology using in Food analysis.
Chemical instrumental analysis in food: principal properties and substances to determinate. Classification of Techniques. Application in food quality. Quantification. Steps and evaluation criteria in analytic method.
U. 3. Determination of global parameters of foods.
Humidity analysis. Methods of drying (stove, furnace microwaves and infrared). Procedures of distillation. Physical and chemical methods (Karl Fischer). Methods of ash determination: calcination
U. 4.Global determination of the main components of foods.
Methods of fat determination and composed of lipidic nature (Goldfish, Mojonnier, Babcock, Gerber, TO GO). Methods of protein determination and amino acids (Kjeldhal, Dumas, Biuret, Lowry, Bradford). Methods of carbohydrate determination (sulfuric fenol-acid, enzymatic Somogyi-Nelson, Potterat-Eschmann, methods). Determination of the fiber content (Scharrer-Kürschner). Determination of other components.
U. 5. Spectroscopic techniques applied to the food analysis.
Introduction to the spectroscopy: the electromagnetic radiation. Spectroscopy of ultraviolet light (UV), visible (VIS) and infrared (TO GO). Spectroscopy of absorption, emission and molecular and atomic dispersion. Spectroscopy of fluorescence. Spectroscopy of atomic absorption (AA), spectroscopy of atomic emission with plasma of inductive connection (ICP). Applications to the food analysis: calibrated curve of.
U.6. Food analysis by hi-res gas chromatography (HRGC).
Introduction to the HRGC. Main applications of GC in foods. Analysis of the aroma of foods. Stereo-differentiation of chiral components of the aroma of foods. Volatile compounds and derivatisation. Analysis of components of the lipidic fraction
U. 7. Analysis of remainders and food polluting agents by HRGC.
Environmental Analyses of remainders of pesticides and polluting agents in foods. Last advances: Specific detectors. Fast analyses by GC.
U.8.Analysis of majority components of foods by chromatography in liquid phase of hi-res (HPLC).
Introduction to the HPLC. Classification of the chromatographic techniques and its application in the food analysis. Chromatography of hi-res in liquid phase: instrumentation and mechanisms of separation (adsorption distribution, molecular exclusion, ionic, even interchange ionic). Analysis of majority nutrients: carbohydrates, proteins, peptides and amino acids, lipids (triglyceride and fatty acids, no saponified fraction of oils. Development of a chromatographic method of HPLC. Last advances in chromatography in liquid phase for the food analysis.
U.9. Analysis of minority components, food remainders and polluting agents by HPLC.
Specific techniques and chromatographic methods. Analysis of organic acids, vitamins, minerals, dyes and phenolic compounds in foods. Analysis of remainders and polluting agents.
U.10. Applied electrophoretic techniques in the food analysis.
Introduction to the electrophoretic techniques. Capillary electrophoretic. Instrumentation of aelectrophoretic system. Mechanisms of separation. Applications in foods: bioactive, transgenic proteins and peptides. Analysis of juices, wines and milk.
U.11. Spectrometry of mass.
The Spectrometry of Mass (MS) in the food analysis. Types of Ionization. Ion separation: main types. Detection. Connections with chromatographic gas techniques (GC/MS). Common applications of HPLC/MS with different separators (Quadupolo, Q-TOF, Triple Quadrupolo). Systems tandem (MSn).
U.12.Connections and automatization of instrumental techniques.
Connection between techniques of preparation of sample and techniques of separation (SPE-GC, SPE-HPLC, SPME-GC). Connection between chromatographic techniques: LC-GC and multidimensional Chromatography. Automatization.
U.13. Refractometry.
Introduction to the r Refractometry.. To describe the Abbe refractometer. Possibilities, precautions and way to make the measures. Degree brix, like making its determination.

Lab class
1. Drink caffein determination by UV-Vis spectrometry applying the Beer´s law
2. Tonic water quinine determination by fluorescence spectroscopy applying the Kavanagh´s law.
3Heat determination of food combustion with a calorimetric pump
4 Determination of the thermal food conductivity certain.

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