

## COURSE: AGROFOOD ANALYSIS

**SUBJECT:** Environmental, Food and Pharmaceutical Analysis

**MODULE:** Specific

**PROGRAM:** University Master's Degree in Analytical Chemistry

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### GENERAL FEATURES \*

**Type:**  Basic Training  Compulsory  Elective

Master's thesis work,  Practicum

**Duration:** Semester

**Semester / s:** 2

**Number of ECTS credits:** 5

**Language / s:** Spanish, Catalan, English

### DESCRIPTION

**BRIEF DESCRIPTION AND JUSTIFICATION** (The meaning of the course in relation to the program. Between 100 and 200 words.)

The general objective of the Master in Analytical Chemistry by the Universitat Ramon Llull is to provide students with the necessary tools to tackle a global analytical process. For this reason, it is important for the students to acquire enough knowledge on the main matrices to which analytical processes are applied.

Among the main matrices are those of food origin. The basic objective of this course is to provide the student with chemical knowledge of food from an analytical point of view.

For this reason, the subject is divided into two main chapters: analysis of food composition and chemical properties of food.

**COMPETENCES** (Of course you put in relation to the skills pre-assigned in the field.)

#### **Basic competences**

CB6 - Have and understand knowledge which provides the ground or opportunity to be innovative in the development and/or application of ideas, often in a research context

CB8 - Integrate knowledge and deal with the complexity of formulating judgments based on information which, being incomplete or limited, includes reflections on social and ethical responsibilities related to the application of their knowledge and judgments

CB9 - Communicate conclusions, and the reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.

CB10 - Understand the need for life-long learning in a self-directed or autonomous way.

#### **General competences**

CG1 - Ability to lead, direct and manage projects in academic or business environments adapting to the structures, needs and ways of operation of each institution

\* These features should not be modified without the approval of the bodies responsible for academic higher-level structures (field, module and / or system).

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### ***Specific competences***

E17 - Demonstrate advanced knowledge of analytical methods for determining composition and functional properties of food, and for identifying and quantifying impurities, foreign substances and residues in samples of food and agricultural products.

E18 - Ability to interpret the analytical results obtained in food samples (composition and functional properties) as well as and in the identification and quantification of impurities, foreign substances and residues in these samples.

### ***Transversal competences***

T1 - Ability to communicate in English and use English as a working language

T3 - Ability to assess the impact of the use of chemistry in the sustainable development of the society

**PREREQUISITES \*** (Modules, materials, disciplines or expertise needed to track the subject. Contain subjects that must have been completed can be made.)

Students who have accessed the master's degree from bachelor's degrees in chemistry will not need any additional training complement. For the other degrees, they must have previously studied subjects that included basic contents of instrumental analytical chemistry and structural elucidation (including mass spectrometry) and statistics.

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### **CONTENTS** (Sections that make up the syllabus, to a second level of detail.)

1. Food Analysis: general points
  - 1.1. Introduction to Food Analysis
  - 1.2. EFSA in the food analysis and contamination control.
  - 1.3. Other regulatory agencies.
  - 1.4. Food Security "White book".
2. Compositional Analysis of Foods
  - 2.1. Moisture and Total Solids Analysis
  - 2.2. Ash Analysis
  - 2.3. Fat Analysis
  - 2.4. Protein Analysis
  - 2.5. Carbohydrate Analysis
  - 2.6. Vitamin Analysis
  - 2.7. Traditional Methods for Mineral Analysis
3. Advanced Technologies Applied to Food Analysis
  - 3.1. Sample prep analysis
  - 3.2. Low resolution MS and MSMS analysis
  - 3.3. High resolution MS analysis (Time of Flight) applied to food residues analysis.
4. Analysis of Food Contaminants, Residues, and Chemical Constituents of Concern

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### METHODOLOGY

**TRAINING ACTIVITIES \*** (Complete the table relating activities, workload in ECTS credits, and skills.)

Training Activities	ECTS	Competences
Sessions of exposition of concepts	31 / 1.15	E17, E18, T3
Sessions solving exercises, problems and cases	4 / 0.15	E17, E18, T3
Seminars	2 / 0.07	
Presentations	4 / 0.1	E17, E18, T1, T3
Activities of personal study by students	90 / 3.33	E17, E18, T3
Evaluation activities (exams, monitoring controls ...)	4 / 0.15	E17, E18, T3
<b>TOTAL</b>	<b>135/5</b>	

**TEACHING METHODOLOGY** (Justifying the teaching methods used in relation to the competences and contents of the course. Between 100 and 200 words.)

- Sessions of exposition of concepts: Exposition of contents through presentation or explanation (possibly including demonstrations) by a professor.
- Sessions solving exercises, problems and cases: Solving exercises, approach / problem solving and presentation / discussion of cases by a professor with the active participation of students.
- Seminars: Statement made by a teacher in order to review, discuss and answer questions about materials and topics presented in the sessions of exposure sessions concepts and solving exercises, problems and cases.
- Presentations: Oral presentation to a professor and possibly other students by a student. It can be a paper prepared by the student by searching the published literature or a summary of a practical or project undertaken by the student.
- Activities of personal study by students: Personal work required of the student to acquire the competences of each subject and assimilate the knowledge presented in the sessions of exposition of concepts and of solving exercises, problems and cases, using, when necessary, the consultation recommended material.
- Evaluation activities: Oral and/or written statements made during a semester or after it.

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### EVALUATION

**ASSESSMENT SYSTEM \*** (Complete the table relating evaluation methods, competences and weight in the course grade.)

Evaluation Methods	%	Competences
Final Exam	50%	E17, E18, T3
Monitoring activities	25%	E17, E18, T3
Projects and presentations	20%	E17, E18, T1, T3
Participation	5%	E17, E18, T1, T3

**LEARNING OUTCOMES** (Explanation of the embodiments that allow the student skills assessment, relating them to the skills and methods of assessment.)

The student must demonstrate knowledge of the main methods of sampling in agrofood matrices. (E17, E18)

The student must demonstrate the knowledge of the main analytical methods for the determination of chemical compounds in agro-alimentary matrices. (E17, E18)

The student must demonstrate the knowledge of specific analytical methods for the determination of chemical compounds in agri-food matrices. (E17, E18)

The student must demonstrate his capacity to interpret the results obtained in the determination of chemical compounds in agro-alimentary matrices. (E18, T3)

The student must demonstrate knowledge of the main standards that are applied in the agri-food analysis. (E17)

The student must be able to communicate effectively both orally and in writing, to communicate in English and to use English as a working language, and to work in a multidisciplinary environment individually or as a member of a team. (T1, CG1)

The student must be able to develop learning skills and recognize the need for ongoing training for their proper professional development. (CB10).

**QUALIFICATION** (Explanation of the computer system of the course grade.)

The grade of this course is obtained:

<b>Final exam</b>	50%
<b>Monitoring activities</b>	25%
<b>Projects and presentations</b>	20%
<b>Participation</b>	5%

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**ASSESSMENT OF THE COMPETENCES** (Define calculation expressions for each competence and the relevant evaluation methods.)

The competences are evaluated with the qualification of the subject

### **BIBLIOGRAPHY** (Recommended and accessible to students.)

- Food Analysis, 4th Edition, S. Suzanne Nielsen, Springer 2010.
- Food Chemistry, 4<sup>th</sup> Edition, H.-D. Belitz, Springer 2009.
- Food Chemistry, 3<sup>rd</sup> Edition, Owen R. Fennema editor, Marcel Dekker 1996.

### **DOCUMENT HISTORY**

**PREVIOUS CHANGES** (You set the date and author / s, the most recent first)

February 2015, Dr. Josep Lliberia

January 2013, Dr. Jordi Abellà

**LAST REVISION** (Indicate date and author / s.)

February 2017, Dra. Gemma Gotor