Information about the subject

Degree: Bachelor of Science Degree in Human Nutrition and Dietetics

Faculty: Faculty of Medicine and Health Sciences

Code: 1310208 **Name:** Food Toxicology

Credits: 6,00 **ECTS Year:** 2 **Semester:** 2

Module: Food Science Module

Subject Matter: Toxicology **Type:** Compulsory

Field of knowledge: Health Science

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

1312A	Celia Almela Camañas **(Responsible Lecturer)**	celia.almela@ucv.es
283ND	David Exposito Blasco **(Responsible Lecturer)**	david.exposito@ucv.es

Module organization

Food Science Module

Subject Matter	ECTS	Subject	ECTS	Year/semester
Bromatology	6,00	Bromatology	6,00	2/1
Food Technology	6,00	Food Technology	6,00	2/1
Culinary Technology	6,00	Culinary Technology	6,00	3/1
Microbiology	6,00	Microbiology and Parasitology	6,00	1/2
Toxicology	6,00	Food Toxicology	6,00	2/2

Recommended knowledge

There are no prerequisites

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1   Understands and assimilates the concepts included in the course content.

R2   Shows ability to solve problems related to these contents using different resources.

R3   Shows ability to work in a laboratory performing correctly the basic operations and observing the corresponding security rules. As well as a correct understanding of the planning, development and purpose of the experience.

R4   Understand and adequate uses language, as well as correct writing and presentation of data.

R5   Collaborates with the teacher and colleagues throughout the learning process: Attendance to theoretical, practical or tutoring sessions; teamwork; respect in the treatment; compliance with the rules of organization of the subject for the benefit of all.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB3	Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgements that include reflection on relevant social, scientific or ethical issues.				x

GENERAL		Weighting			
		1	2	3	4
CG11	Students know the microbiology, parasitology and toxicology of food.				x

SPECIFIC		Weighting			
		1	2	3	4
CE15	Students know the microbiology, parasitology and toxicology of food.				x

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R4, R5	10,00%	Evaluation of the use of the practical classes in the classroom, of problems or computers, seminars and tutorials. Through attendance, and participation in the different activities proposed.
R1, R4	60,00%	Written evaluation of the knowledge and skills obtained. The test may consist of a series of open-ended or multiple-choice questions on the theoretical content of the subject and/or practical exercises (problem solving).
R2, R5	15,00%	Assessment of practical laboratory work, or laboratory culinary techniques workshop, through which the competencies acquired must be demonstrated and that they are capable of being used to solve the different situations and problems that arise in a laboratory; this assessment may be carried out by one of the following methods, or a combination of several of them: an individual written test, the individual or group performance of a laboratory experience, the submission of an individual or group report on the work carried out in the laboratory
R2, R3	15,00%	Evaluation of individual or group practices or activities, in which information related to each of the subjects must be sought and structured, and cases or problems resolved. This is done through a system of continuous evaluation throughout the course, which involves the delivery and / or exposure of work, whose objectives and content will be proposed by the teacher.

Observations

Students are expected to obtain a **minimum mark of 5** out of 10 (both in **written** and **Lab tests**)
in order to avergage.

Lab sessions attendance is mandatory

MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1   Exposition of contents by the teacher, analysis of competencies, explanation and demonstration of capacities, skills and knowledge in the classroom. The blackboard, the computer and the cannon will be used to display texts, graphics, etc.

M3   Resolution of practical exercises and case studies, analysis of evaluation procedures and procedural intervention. All this with the support of the teacher. This aspect can be controlled through attendance and active participation in the practical sessions.

M4   Monographic sessions throughout the course, oriented towards current aspects and applications of the subject.

M5   Student study: individual preparation of readings, essays, problem solving, seminars, papers, reports, etc. for discussion or delivery in electronic format.

M7   Personalised attention and in small groups. Period of instruction and/or orientation carried out by a tutor with the aim of reviewing and discussing the materials and topics presented in the classes, seminars, readings, completion of assignments, etc. The attendance of the student and his/her level of gradual development in the knowledge of the subjects will be evaluated.

M8   A set of tests, written or oral, used in the evaluation of the student.

M9   Group preparation of readings, essays, problem solving, seminars, papers, reports, etc... for discussion or delivery.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical lessons M1, M9	R1, R2, R4, R5	39,00	1,56
Laboratory M1, M3, M7	R3, R4, R5	15,00	0,60
Seminar M1, M4	R5	2,00	0,08
Office Hours M7	R1, R5	2,00	0,08
Evaluation M8	R1, R2, R3	2,00	0,08
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Autonomous work M5	R1, R2, R3, R4, R5	70,00	2,80
Group work M9	R3, R5	20,00	0,80
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
BLOCK I: GENERAL TOXICOLOGY	**TOPIC 1. Introduction, concepts and sources of information in Food Toxicology** Introduction. Development and historical evolution of Toxicology. Concepts. Toxic. Classification of toxic substances. Poisoning and intoxication. Classes of intoxication. Toxicity. Dose-effect and dose-response relationship. **TOPIC 2. Toxicokinetics** Exposition. Toxic routes of administration. Absorption: mechanisms. Organic distribution. Accumulation. Metabolism or biotransformation. Biochemical processes involved. Phase I and phase II metabolic reactions. Elimination. Elimination routes. Factors that modify it. **TOPIC 3. Toxicodynamics.** Mechanisms of toxicity. Physiopathological processes of toxic origin. Enzyme inhibition, activation and induction. Genotoxicology: mutagenesis and carcinogenesis **TOPIC 4. Assessment of toxicity and risk.** Experimental toxicology: Toxicity tests. Analysis of toxic risk. Evaluation of novel foods.

BLOCK II: TOXICOLOGY OF ABIOTIC FOOD CONTAMINATION	**TOPIC 5. Inorganic elements.** Overview. Metals and semi-metals: lead, mercury, cadmium, arsenic, copper, tin, aluminum, Other elements. **TOPIC 6. Pesticides** Overview. Classification. Insecticides: organochlorines, organophosphates, carbamates, pyrethrins and pyrethroids. Herbicides. Fungicides. **TOPIC 7. Physical contamination.** Radionuclide toxic risk. The irradiated food. **TOPIC 8. Additives.** Evaluation of the toxicity of additives. Dyes, preservatives, sweeteners. **TOPIC 9. Persistent organic pollutants.** Persistent organic pollutants. Dioxins, PCDF and PCB's .. Perfluoroalkylated substances (PFOA and PFOS). Brominated flame retardants (BFR). **TOPIC 10. Toxics formed during food processing and handling. Plastic component waste.** Toxics formed during food processing and handling. Plastic component waste. **TOPIC 11. Pharmacological residues** Drugs. Overview. Applications. Thyrostatics, anabolic steroids, beta-agonists
Block III: NATURAL TOXINS AND TOXICS FROM FOOD	**TOPIC 12. Plant toxicology.** Overview. Toxic substances present in plants. Factors that modify the toxicity of plants. Phenolic compounds: tannins, phytoestrogens, gossypol and coumarins. Nitrogenous compounds: alkaloids, nitrates, nitrites lectins, toxic amino acids, protease inhibitors, cyanogenic glycosides, glucosinolates and latirismo. Saponins. Other intoxications of plant origin: photosensitization and oxalates. Medicinal plants poisoning. **TOPIC 13. Superior fungi.** **TOPIC 14. Mycotoxins.** **TOPIC 15. Marine biotoxins.** Mollusc poisoning: PSP, ASP, DSP, PTX, YTX, and other toxins. Fish poisoning: scombrotoxin, ciguatera, tetrodotoxin. **TOPIC 16. Bacterial toxicology.** Overview. Food poisoning: botulism, clostridiosis, staphylococcosis. *Bacillus cereus* poisoning. Food poisoning: *E. coli,* salmonellosis, listeriosis, vibriosis, sighelosis, campylobacteriosis.

Temporary organization of learning:

Block of content	Number of sessions	Hours
BLOCK I: GENERAL TOXICOLOGY	5,00	10,00
BLOCK II: TOXICOLOGY OF ABIOTIC FOOD CONTAMINATION	19,00	38,00
Block III: NATURAL TOXINS AND TOXICS FROM FOOD	6,00	12,00

References

·**BASIC BIBLIOGRAPHY**

1.Camean, AM y Repetto M (2006). Toxicologia Alimentaria. Publisher Diaz de Santos. ISBN: 978-84-7978-727-1

2.Repetto Jimenez, M, Repetto, M, Repetto Kuhn, G (2009). Toxicologia fundamental. Editorial Diaz de Santos. ISBN 978-84-7978-898-8

·**COMPLEMENTARY BIBLIOGRAPHY**

1.Calvo Carrillo, MC, Mendoza Martínez, E (2012) Toxicologia de los alimentos (México, McGraw-Hill)

2.Bello J, López De Cerain A (2001) Fundamentos de Ciencia Toxicológica. (Madrid, Díaz de Santos)

3.Klaassen CD and Watkins JB. (2005) Casarett y Doull. Fundamentos de Toxicología. (Madrid, McGraw Hill Interamericana)

4.Soriano del Castillo JM, Montoro Pastor A (2013) Últimos avances en radioprotectores de origen natural (Madrid, Consejo de Seguridad Nuclear)

·**Links suggested**
1.**European Food Safety**
(EFSA): https://europa.eu/european-union/about-eu/agencies/efsa_es
2.**Spanish Agency for Food Safety and Nutrition**
(AESAN): https://www.aesan.gob.es/AECOSAN/web/home/aecosan_inicio.htm
3.**Spanish Society of Comunitari Nutrition (SENC):** http://www.nutricioncomunitaria.org/es/
4.**European Commission. Food, Farming, Fisheries:** https://ec.europa.eu/food/overview_en