

**COURSE DATA****Data Subject**

Code	34008
Name	Food Toxicology
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1103 - Degree in Food Science and Technology	Faculty of Pharmacy and Food Sciences	3	Second term

Subject-matter

Degree	Subject-matter	Character
1103 - Degree in Food Science and Technology	20 - Food toxicology	Obligatory

Coordination

Name	Department
BERRADA RAMDANI, HOUDA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.
FONT PEREZ, GUILLERMINA	265 - Prev. Medicine, Public Health, Food Sc.,Toxic. and For. Med.

SUMMARY

The subject of food toxicology (34008) is a subject of mandatory third-degree course of Human Nutrition and Dietetics, which is taught in the Faculty of Pharmacy, University of Valencia. This course provides the current curriculum for a total of 6 ECTS credits are given twice a year.

The main objective of the subject of Food Toxicology is the toxicological formation with the purpose of guaranteeing to the population safe foods. For this, knowledge will be provided on several blocks: General toxicology including the phases of the toxic phenomenon, the evaluation of toxicity and risk. Food intoxications, that is, pathologies caused by natural toxins, biological contaminants, chemical pollutants as inorganic and organic, natural or synthetic and toxic derivatives. Computer and laboratory practices will be carried out where analytical methods will be applied to determine toxic concentrations in food and interpret the results obtained.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

To study toxicology, knowledge of a number of basic concepts of biology, physiology, chemistry and biochemistry are needed. These concepts are part of the contents of the subjects taught during the previous courses in the Graduate.

OUTCOMES

1103 - Degree in Food Science and Technology

- Capacidad de interpretar datos relevantes.
- Manage food safety.
- Poseer y comprender los conocimientos en el área de Ciencia y Tecnología de los Alimentos.
- Desarrollo de habilidades para emprender estudios posteriores.
- Know the different toxicokinetic and ecotoxicokinetic processes of toxic substances.
- Analyze and evaluate food safety risks.
- Know about the harmful effects of toxic substances in food, mechanism and signs of these effects.
- Conocer y manejar las fuentes de información básicas relacionadas con la Toxicología alimentaria.
- Conocimiento adecuado de los mecanismos generales de la acción tóxica.
- Know about toxicological risk assessment procedures.
- Know about the changes in toxic substances taking place during the technological processing of foodstuffs.
- Prevent food poisoning by establishing toxicity safety limits in order to ensure safe food to the population.
- Know the methods most commonly used for the analysis of toxics in food.

LEARNING OUTCOMES

By undertaking this course, students should acquire the following skills and abilities:

- Basic toxicology knowledge.
- Ability to find solutions to basic toxicological problems, mainly by relating the chemical and structural properties of food contaminants.
- Presentation of database most used on toxicology, to explore toxic effects of food contaminants and their structure activities.
- Training into toxicological analysis to perform experimental work in the laboratory as introduction to a scientific and research career.



DESCRIPTION OF CONTENTS

1. General Toxicology: Toxicity and concepts

Unit 1. Food Toxicology: Introduction. Historical evolution. Bibliography.

Unit 2. Toxicological concepts. Intoxication classification. Classification of toxic substances.

Unit 3. Dose-effect relationships and dose response. Uncertainty factors

2. Phases of toxic action. Toxicokinetic. Mechanisms

Unit 4. Phases of toxic action. Exposure phase. Entrances of the toxics. Mechanisms of passage of toxics through biological membranes. Absorption.

Unit 5. Distribution, fixation and excretion of toxics.

Unit 6. Toxicokinetic phase. Compartmental models.

Unit 7. Biotransformations of toxics. Phase 1 reactions: oxidation, reduction, hydrolysis and hydration.

Unit 8. Phase 2 reactions: sulfatation, glucuronation, methylation, acetylation and conjugation with glutathione and amino acids.

Unit 9. Mechanisms of toxicity. Apoptosis and necrosis

Unit 10. Mechanisms of Non-specific toxicity and specific toxicity. Reversible and irreversible reactions.

Unit 11. Immunological mechanisms. Food allergies.

Unit 12. Factors that modify the toxicity. Factors that depend on the individual: genetic factors. Environmental factors.

3. Evaluation of the toxicity.

Procedures for toxicological evaluation. Tests of general and specific toxicity.

Chapter 13. Procedures for toxicological evaluation. Acute toxicity tests, subchronic and chronic.

Chapter 14. Carcinogenic, mutagenic, teratogenic and reproductive toxic effects. Empowerment, skin, eyes and behaviour.

Chapter 15. Alternative methods. Vitro assays. Biological substrates. Indicators of toxicity.

4. Food Toxicology

Unit 16. Marine food: Intoxications by molluscs and fish.

Unit 17. Toxics in vegetable products. Anti-nutritive substances. Superior mushrooms.

Unit 18. Toxic effects of biological contaminants. Food intoxications. Botulism, Bacillus cereus and Staphylococcus aureus.

Unit 19. Food toxin infections: salmonellosis, listeriosis, toxin infection by Escherichia coli, Clostridium perfringens toxicity and campylobacteriosis.

Unit 20. Inorganic chemical contaminants. Metals (I): Lead and mercury. Causes of food contamination by metals. Sources of exposure: lead and mercury. Mechanisms of action and toxic effects. Speciation.

Unit 21. Metals (II): arsenic, cadmium and aluminum. Mechanisms of action and main toxic effects. Speciation Food implicated as a source of exposure.

Unit 22. Toxic effects of fluorides, nitrates and nitrites.



Unit 23. Mycotoxins. Most frequent foods involved as sources of exposure.

Unit 24. Organic chemical contaminants. Pesticides: classification and toxicity.

Unit 25. Organophosphorus pesticides, carbamates and bipyridyl salts. Mechanisms of action and toxic effects. Presence in foods. Preventive measures.

Unit 26. Residues of veterinary drugs.

Unit 27. Food additives. Definition and classification.

Unit 28. Food supplements. Vitamins Minerals Other supplements. Adverse effects.

Unit 29. Toxics formed during the processing, preparation and storage of food. Pyrogenic compounds. Non-pyrolytic compounds. Compounds formed by alkaline treatments.

Unit 30. Toxics derived from the heating and oxidation of fats and oils. Toxics formed by degradation or reaction of contaminants.

Unit 31. Food carcinogens. Diet-cancer.

Unit 32. Risk analysis. Risks evaluation. Characterization of risks. Risk management.

5. Food Toxicology practices

Good Laboratory Practice. Standard analytical food toxicology analysis. Analysis of toxic xenobiotics and as a means of quality control. Types of analysis. Toxicological analysis techniques. Evaluation of analytical data. Toxicology report

1. Safety in handling chemicals.
- 2 .- Management of Databases in Toxicology
- 3 .- Determination of nitrate in vegetables by visible spectrometry
- 4 .- Determination of herbicides in water by liquid chromatography
- 5 .- Determination of pesticides by solid phase extraction and gas chromatography.
- 6 .- Determination of nitrite in meat by visible spectrometry.
- 7 .- Determination of fluoride in water by potentiometer

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	9,00	0
Preparing lectures	76,00	0
Preparation of practical classes and problem	5,00	0
TOTAL	147,00	



TEACHING METHODOLOGY

The development of the course is structured as follows:

Theoretical classes the teacher provides the student an overview of the topic, and the information necessary to understand the contents of the subject. In these classes the students themselves are encouraged to conduct the search for accessory or additional information, guiding the use of bibliographical sources needed. To monitor the class the student is recommended to review the material before the teacher leaves the virtual classroom.

Specialized tutoring sessions in groups. Be organized in small groups of students in order to guide students and determine the functioning of the course. It will be the ideal means for students to raise questions or issues they arise throughout the development agenda.

Hands-on labs. Be conducted in small groups and attendance is mandatory. He goes step by step the student's work, to make acquire dexterity in the laboratory and determine for himself the problems that are raised. The last day of training students exposed to the group results and discuss the toxicological interpretation of them. Upon completion, must submit a notebook memory of them.

Within this block includes a practical computer, which guides the student on toxicological information search on the Internet and access to databases useful in Toxicology.

Seminars / jobs. There will be a group work on an issue raised by the teacher in order to expose the rest of the class and generate further debate. Be given in writing prior to the show a script to peers. The group is personally supervised by the teacher on a regular basis and directs the search of bibliographic sources and critical analysis of the data found in these sources. The teacher advised about the general approach of the work, so to build capacity for work, synthesis and research student

EVALUATION

For the evaluation of the theoretical contents, an examination of the syllabus of the subject will be carried out. The score achieved will represent 70% of the overall grade of the subject.

The practical laboratory classes will be evaluated by means of the attendance and the realization of a written exam, which will take place in the same call than the examination of the theoretical contents. At the end of the internship, the student must present a practice report that will be qualified as apt or not. The qualification of practices will represent 20% of the final grade.

The preparation and presentation of seminars will represent 10% of the final grade. The content, structure and expression of the written work will be evaluated as well as the capacity for synthesis and clarity in the oral presentation.

The students, who do not pass the subject in the first exam, will keep the note corresponding to seminars for the July exam.



REFERENCES

Basic

- T Repetto M, Repetto G. Toxicología Fundamental. 4 ed, Díaz de Santos, Madrid, 2009.
- Klaassen CD, Watkins JB. Casarett y Doull fundamentos de Toxicología. Mc Graw-Hill Interamericana, Madrid (2005).
- Ballantyne B, Marrs TC, Syversen T. general and Applied Toxicology. 3rd ed. Wyley & Sons, West Sussex, 2009.

Additional

- Cameán A, M Repetto. Toxicología Alimentaria. Díaz de Santos, Madrid 2006.
- T Ballantyne B, Marrs TC, Syversen T (2009) General & Applied Toxicology. 3rd ed. Wyley & Sons, West Sussex exto referencia
- Hayes AW (2009) Principles and Methods of Toxicology. Taylor & Francis, London.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Continguts / Contenidos

Se mantienen las unidades temáticas inicialmente recogidas en la guía docente.

2. Volum de treball i planificació temporal de la docència/Volumen de trabajo y planificación temporal de la docencia

En particular, los contenidos del modulo 3 de evaluación toxicológica y los contenidos del modulo 4 de toxicología alimentaria a partir de la unidad 20 se imparten mediante videoconferencias. El tiempo de dedicación total en términos de cómputo de ECTS no se modifica, pero se produce un trasvase de 15 horas presenciales a no presenciales.

Las sesiones de tutoría se realizarán de forma on-line, mediante videoconferencia, en los horarios previstos en el calendario académico.



Los seminarios se mantienen. Los alumnos implicados en la realización del seminario entregarán al profesor memoria y power point correspondientes según el calendario acordado en las sesiones de trabajo. Los compañeros tendrán que contestar a preguntas formuladas sobre la temática del seminario y entregarlas en tarea seminario.

3. Metodología docent/Metodología docente

Las sesiones de tutorías inicialmente planteadas en el aula se transforman en sesiones telemáticas sincrónicas a través de la herramienta Blackboard Collaborate integrada en Aula Virtual.

Las tutorías individuales se mantienen, bajo demanda, mediante sistemas de videollamada previa concertación de sesiones por el blackboard

4. Avaluació/Evaluación

Se mantiene el peso de cada apartado en la evaluación: Teoría (70%), Prácticas (20%) y Seminario (10%)

Se incrementa el peso de la evaluación continua al evaluar las actividades propuestas a los alumnos referente a las practicas (memoria de prácticas, tareade tutoría y cuestionario de resolución de problemas) con el 20% de la nota. El examen final pasa a tener solo contenidos teóricos con el 70% de la nota.

El examen se llevará a cabo en el horario propuesto por la Facultad de Farmacia, de forma telemática, a través del aula virtual.

Si una persona no dispone de los medios para establecer esta conexión y acceder al aula virtual, deberá contactar con el profesorado por correo electrónico en el momento de publicación de este anexo a la guía docente.

En esta actividad se tiene que obtener una nota mínima de 5/10 por aprobar la asignatura

La prueba de conceptos teóricos estará basada en una batería de preguntas tipo test, que se genera de forma automática y aleatoria a partir de un banco de preguntas de dificultad homogénea. Se estima un tiempo de 1 minutos por cada pregunta.

5. Bibliografia/Bibliografía

Se sustituyen los manuales recomendados por los apuntes y documentos que se



suben al aula virtual.

