

Course Unit	Analysis and control of chemical hazards	Field of study	Food industries
Master in	Food Quality and Safety	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	1
Workload (hours)	162	Contact hours	T - TP - PL - TC - S - E - OT - O -
		Level	2-1
		Code	6369-785-1102-00-23
		ECTS credits	6.0

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Clementina Maria Moreira dos Santos, Maria Fátima Alves Pinto Lopes da Silva

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Identify and to know potential food chemical hazards, as well as good practices to prevent or reduce them.
2. Relate technological processes and food preservation with the presence of certain chemical hazards.
3. Identify potential toxicological risks associated to foodstuffs in order to minimize/eliminate these risks.
4. Relate domestic, agricultural and industrial practices with the presence of residues in foodstuffs.
5. Knowing the main routes of entry of toxic substances in the body and its metabolism.

Prerequisites

Before the course unit the learner is expected to be able to:

Possess knowledge in the domains of general chemistry and general microbiology.

Course contents

Determinants for the food chemical safety: origin and classification of the chemical hazards, intrinsic and extrinsic. Physical hazards to food safety. Hazards associated with the production, processing and preservation of foodstuffs. Hazards of natural origin, residues and contaminants. Means and routes of entry of toxic substances in the body; biotransformation of xenobiotics. Official control plans for foods and feeds; RASFF system and ACN. Precautionary Principle.

Course contents (extended version)

1. Factors that determine chemical food safety
 - Concepts, origin and classification of chemical hazards (intrinsic and extrinsic)
 - Risk points in the food chain; chemical hazards incidence; importance of traceability
2. Hazards associated with the production, processing and preservation of foods
 - Chemical hazards on the production and storage of raw horticultural crops, fruits and mushrooms
 - Chemical hazards in foods of animal origin
 - Chemical hazards in food supplements
 - Other chemical hazards resulting from technological processes
 - Presence of food additives and allergens - control and legal requirements
 - Physical hazards: radiation and foreign bodies
3. Natural toxic substances in foods: lectins, fitats, saponins, others
4. Toxics with origin in technological operations: pesticides, PCBs, dioxines, PAHs, others
5. Toxic effects of other elements: solvents; antibiotics; radioactive elements, others
6. Heavy metals toxicity: cadmium, tin, arsenic, plumb, mercury
7. Substances migration from packaging
8. Ways of toxic entrance in human organism
9. Xenobiotics biotransformation. Fase I and II mechanisms
10. Official control plans for foods and feeds; RASFF system and ACN network
11. Precautionary Principle. Exploitation of electronic sources of information on chemical hazards

Recommended reading

1. Páginas institucionais: www.dgav.pt; www.asae.gov.pt; www.efsa.europa.eu
2. d'Mello, J. P. F. (Edi.) (2003). Food Safety: Contaminants and Toxins. CABI Publishing, London, UK, 472 pp.
3. Autoridade de Segurança Alimentar e Económica. (2012). Perfil de risco dos principais alimentos consumidos em Portugal. ASAE - Direcção de Avaliação e Comunicação dos Riscos.
4. Klaassen, Curtis D. ; Watkins, B. , John (2001). Toxicologia A Ciência Básica dos Tóxicos. De Casarett & Doull's. Mcgraw-Hill de Portugal, Lda. 5ª Edição.
5. Hodgson, E. (2010). A Textbook of Modern Toxicology, 4th Edition, John Wiley & Sons, New Jersey, USA (ISBN 978-0-470-46206-5)

Teaching and learning methods

Theoretical and practical lessons will use expositive, active (worksheets) and interrogative methods. Laboratorial lessons with demonstrative and active methods. Personal and/or tutorial study based in the reading of the recommended bibliography available in the Institute and in information supplied by e-learning and in institutional internet sites.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 85% (Final exam covering all theoretical and practical topics.)
 - Reports and Guides - 15% (Individual or group worksheets and/or reports, to be carried out during the semester.)
2. Alternative 2 - (Regular, Student Worker) (Final)
 - Intermediate Written Test - 35% (Final exam covering half of theoretical and practical topics (Part I).)
 - Intermediate Written Test - 50% (Final exam covering half of theoretical and practical topics (Part II).)
 - Reports and Guides - 15% (Individual or group worksheets and/or reports, to be carried out (Part I).)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Clementina Maria Moreira dos Santos, Maria Fátima Alves Pinto Lopes da Silva	Maria da Conceição Constantino Fernandes	Maria Letícia Miranda Fernandes Estevinho	José Carlos Batista Couto Barbosa
18-01-2024	18-01-2024	18-01-2024	19-01-2024