COURSE SYLLABUS

Academic Year: 2020/2021

Identification and characteristics of the course				
Code	502224	ECTS Credits		6
Course title (English)	**Food Quality Control and Analysis**			
Course title (Spanish)	Análisis y Control de Calidad de los Alimentos			
Degree programs	Food Science and Technology			
Faculty/School	School of Agricultural Engineering			
Semester	7th	Course type (compulsory/optional)	Compulsory	
Module	Food Science			
Subject matter	Food Quality Control and Analysis			
Lecturer/s				
Name		Room	E-mail	Web page
Alberto Martín González		D704 Valle del Jerte building	amartin@unex.es	
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Alicia Rodríguez Jiménez		D710 Valle del Jerte building	aliciarj@unex.es	
Subject Area	Nutrition and bromatology			
Department	Animal Production and Food Science			
Coordinator (Only if there is more than one lecturer)	**Alberto Martín González**			

Competencies*

1. BASIC COMPETENCIES

CB1 - ~~That~~ The students have to demonstrate~~d~~ to possess and understand knowledge in a topic ~~study area~~ that starts from the general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study.

CB2 - T~~hat t~~he students have to ~~know how to~~ apply their knowledge to their work or vocation in a professional way, and possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

CB3 - The~~hat~~ students have to possess the ability to collect and interpret relevant data (usually within their study area) to make judgments that include reflection on relevant social, scientific

* The sections concerning competencies, course outline, teaching activities, teaching methodology, learning outcomes and assessment methods must conform to those included in the ANECA verified document of the degree program.

or ethical issues. CB4 ~~–~~ The ~~hat~~ students have to demonstrate ability to~~can~~ transmit information, ideas, problems and solutions to both a specialized and non-specialized audience CB5 - The~~at~~ students have to develop~~ed those~~ learning skills necessary to undertake further studies with a high degree of autonomy
2. GENERAL COMPETENCES CG1 - In the field of quality control and management of processes and products, capacity to establish quality control procedures and manuals; to implement and manage quality systems; to analyze food, raw materials, ingredients, additives and issue the corresponding reports; to evaluate and improve the quality of the analysis methods applied to food control. CG8 - In the field of legal, scientific and technical advice, ~~be able to~~capacity of studying and interpreting the reports and administrative files related to a product, in order to be able to respond reasonably to the arisen question ~~answer the question that arises~~; knowing the current legislation; defending ~~before the administration~~ the needs to modify a regulation related to any product in the administration.
3. CROSS-CUTTING COMPETENCES CT1 ~~–~~ Knowledge of ICT ~~mastery~~ at a basic level. CT3 ~~–~~ To ~~P~~provide knowledge and teaching-learning methodologies at different levels; collect and analyze existing information CT4 - Ability to effectively and efficiently solve problems, demonstrating the start~~principles~~ of originality and self-direction. CT5 - Capacity for critical reasoning, analysis and synthesis. CT6 - Effective and efficient management skills with an entrepreneurial spirit, initiative, creativity, organization, planning, control, decision-making and negotiation. CT7 - ~~Autonomous~~ Self-learning capacity and concern about learning~~for knowledge~~ and ongoing training. CT8 - Knowledge of the principles and methods of scientific and technical research. CT9 - Capacity for teamwork. CT10 - Permanent concern about~~for~~ quality and the environment, the prevention of occupational risks and social and corporate responsibility
4. SPECIFIC COMPETENCES CECA2: To r~~R~~ecognize the components of food and their physicochemical, nutritional, functional and sensory properties. CECA3: To ~~A~~acquire skills and abilities in food analysis CECA4: To ~~E~~establish mechanisms for quality control and traceability in the food chain. CECA5: To d~~D~~esign and develop experimental tests to evaluate food and food processes.
Contents
Course outline*
Analysis and Control of Food Quality aims to study the concepts related to traceability, quality control and authenticity of food, delving into the following aspects related to its analysis: • Collection, preparation and conservation of samples • Bases and principles of the methods used for quality control and authenticity of food: o Molecular and immunological biology techniques. o Compositional analysis. o Sensory analysis of food. Statistical methods applied to quality control in the agri-food industry.
Course contents
Title of unit 1: Concepts and definitions **Contents of unit 1:** 1.1. ~~FThe quality of f~~ood quality. Concept of quality and its evaluation. Main attributes of food quality. Quality standards.

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1.2. Food aAlterations ~~in the quality of food.~~ Physical, ~~type alterations.~~ cChemical ~~type~~ and ~~alterations. B~~biological alterations. Fraud and adulterations.
Skills acquired: CB1, CB4, CB5, CG1, CG5, CT3, CT7, CT8, CECA2.
Learning outcomes: RA49, RA50, RA51, RA52, RA53.

Title of unit 2: Food quality control
Contents of unit 2:
2.1. Food quality control. Concept. Traceability in quality control. Management, control and quality assurance systems.
2.2. Statistical methods applied to quality control. Acceptance control upon reception. Statistical processes control. Graphics for quality control by variables and attributes. Analysis of the capacity of a process. End-product quality guarantee.
2.3. Bases and principles of the methods used for quality control and authenticity of food. Molecular and immunological biology techniques. Compositional analysis. Sensory analysis of food.
Skills acquired: CB1, CB4, CB5, CG1, CG5, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53.
Description of practical activities for unit 2:
PRACTIC~~E~~AL SESSION 1. Introduction
~~Theme c~~Contents:
• Taking, preparing and preserving samples.
• Control ~~the~~ of container and labeling.
Type and place: L75 Laboratory
Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53
Material and instruments ~~to use~~: Balances, Precision balance, Homogenizers.

Title of unit 3: Food quality assessment
Contents of unit 3:
3.1. Food water content. Importance of water in food. Analytical methods for determining the water content. Concept of water activity and its importance in food. Analytical methods for determining water activity.
3.2. Carbohydrate content of food. Carbohydrates in food. Importance of carbohydrates in food. Analytical methods for the determination of carbohydrates.
3.3. Nitrogen content of food. Nitrogen compounds in food. Importance of nitrogenous components in food. Analytical methods for the determination of nitrogenous compounds.
3.4. Content of lipid compounds in food. Lipid compounds in food. Importance of lipids in food. Analytical methods for the determination of lipid compounds.
3.5. Vitamin content of food. Vitamins in food. Importance of vitamins in food. Analytical methods for the determination of vitamins.
3.6. Mineral content of food. Minerals in food. Importance of minerals in food. Analytical methods for the determination of minerals.
3.7. Content of other components of food. Phytochemicals in food. Importance in food. Analytical methods for the determination of phytochemicals.
3.8. Food Additives. Additives in the agri-food industry. Importance of additives. Analytical methods for the determination of additives.
Skills acquired: CB1, CB4, CB5, CG1, CG5, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53
Description of practical activities for unit 3:
PRACTICAL SESSION~~E~~ 1. Introduction
~~Theme c~~Content:
Taking, preparing and preserving samples.
Control of packaging and labelling.
Type and location: Laboratory L75
Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53
Material and instruments: Scales and ~~P~~precision balance,

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Con formato: Fuente: Sin Negrita, Subrayado, Español (España, internacional)
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Homogenizers

PRACTICAL SESSIONE 2. Assessment of the quality of meat and derivatives

~~Theme c~~Contents:

• Determination of pH and CRA of fresh meat. PSE or DFD meats
• Thawed or fresh meat
• Determination of collagen in meat products
• Determination of starch in cooked meat products

Type and place: L75 Laboratory

Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.

Materials and instruments ~~to be used~~: Balances, Precision balance, pH meter, SDS-PAGE, spectrophotometer.

PRACTICAL SESSIONE 3. Assessment of the quality of fish, shellfish and derivatives

~~Theme c~~Contents:

• Determination of the degree of freshness of fish and shellfish
• Determination of fish species.

Type and place: L75 Laboratory

Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.

Learning outcomes: RA50, RA51, RA52, RA53

Materials and instruments: ~~to use:~~ European regulations and~~,~~ sensory analysis

PRACTICAL SESSIONE 4. Assessment of the quality of milk and derivatives

~~Theme c~~Contents:

• Total solids
• Stability to alcohol
• Butter quality: Fat refraction index

Type and place: L75 Laboratory

Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.

Learning outcomes: RA50, RA51, RA52, RA53

Materials and instruments ~~to use~~: Drying stove~~, and~~, Refractometer.

PRACTICAL SESSIONE 5. Evaluation of the quality of the egg and egg products. Edible fats and oils.

~~Theme c~~Contents:

• Study of the degree of freshness of eggs and egg products.
• Determination of the extinction coefficient of olive oils.
• Determination of fatty acids.

Type and place: L75 Laboratory

Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.

Learning outcomes: RA50, RA51, RA52, RA53

Materials and instruments ~~to use~~: Caliber, Spectrophotometer, Gas chromatograph.

PRACTICAL SESSIONE 6. Evaluation of the quality of cereals, legumes and derivatives.

~~Theme c~~Contents:

• Determination of the presence of transgenic corn
• Determination of presence of soft wheat in semolina
• Quality control in pulses

Type and place: L75 Laboratory

Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.

Learning outcomes: RA50, RA51, RA52, RA53.

Materials and instruments ~~to use~~: PCR-RT, PCR and~~,~~ Spectrophotometer

PRACTICAL SESSION 7. Evaluation of the quality of fruits, vegetables and derivatives

C~~Theme c~~ontents:

• Control of categorization of fruits and vegetables
• Quality control of canned fruits and vegetables.
• Quality control of frozen fruits and vegetables

Comentario [A1]: Esto está en la unidad 2, revisad donde se incluiría

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Type and place: L75 Laboratory
Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53.
Materials and instruments ~~to use~~: pH meter, Spectrophotometer.
PRACTICAL SESSIONE 8. Evaluation of the quality of dried fruits, stimulating foods and spices
~~Theme c~~Contents:
• Spices: Determination of paprika adulteration
• Stimulating foods: soluble solids.
• Quality of packaged nuts.
Type and place: L75 Laboratory
Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53.
Material and instruments ~~to use~~: PCR and~~,~~ European regulations.
~~Name of~~ **PRACTICAL SESSIONE 9**. Evaluation of the quality of beverages
~~Theme c~~Contents:
• Determination of wine fraud. Synthetic dyes.
• Determination of phenolic compounds in beverages.
Type and place: L75 Laboratory.
Skills acquired: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5.
Learning outcomes: RA50, RA51, RA52, RA53
Materials and instruments ~~to use~~: Spectrophotometer.

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Seminar on an analytical method
Activity contents:
• Holding a seminar on an analytical method based on scientific work, preferably applied to the quality control of ~~a~~ food, in which the most relevant results have to be showed~~are revealed~~.
• Presentation~~Exhibition~~ and discussion~~debate of~~ the work.
Type and place: Off-site activity
Skills developed: CB2, CB3, CB5, CG1, CG3, CG4, CG5, CG7, CG8, CT3, CT7, CT8, CECA2, CECA3, CECA4, CECA5
Learning outcomes: RA50, RA51, RA52, RA53.
Material and instruments ~~to use~~: Scientific texts, Tools and specialized Software (word processor and presentations).

Educational activities *

Student workload (hours per lesson)		Lectures	Practical sessions				Monitoring activity	Homework
Lesson	Total	L	HI	LAB	COM	SEM	SGT	PS
1.1	4.5	1.5						3
1.2	5.5	1					1.5	3
2.1	4.5	1.5						3
2.2	6	2						4
2.3	7	1.5					1.5	4
2.1_2.3	10			4				6
3.1	4.5	1.5						3
3.2	4	1						3
3.3	4.5	1.5						3
3.4	4	1						3
3.5	4.5	1.5						3
3.6	4	1						3
3.7	4.5	1.5						3
3.8	5.5	1					1.5	3
3.1_3.8	9.25			3.5				5.75

3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
3.1_3.8	9.25			3.5				5.75
Assessment **	3	3						
TOTAL ECTS	150	20.5					4.5	93

L: Lectures (100 students)
HI: Hospital internships (7 students)
LAB: Lab sessions or field practice (15 students)
COM: Computer room or language laboratory practice (30 students)
SEM: Problem-solving classes, seminars or case studies (40 students)
SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials)
PS: Personal study, individual or group work and reading of bibliography

Teaching Methodology*

1. ~~Expository classes~~Lectures and discussion of theoretical content
3. Lab, pilot plants and field practices and activities~~Laboratory practices, pilot plants and field~~
6. Development and presentation of seminars
7. Use of the virtual classroom
9. Study of the ~~subject~~course
10. Search and management of scientific bibliography

Learning outcomes *

RA49. To ~~I~~identify food as a source of energy, nutrients, and functional components.
RA50. To ~~B~~be able to select and use the appropriate methodology in the analysis of the food components.
RA51. To~~U~~ understand the basies of traceability in the food chain and know how to apply the most appropriate techniques for each stage and type of food.
RA52. To ~~P~~possess~~Have sufficient~~ sufficient knowledge to interpret the results of the analytical determinations of a food and its conformity with existing legal provisions.
RA53. To ~~B~~be able to make decisions in the resolution of practical cases of food quality analysis and control.

Assessment methods *

~~Evaluation~~ Assessment criteria	*Entailment*
Description	***QC***
Assessment during the course	
• Face-to-face activities (~~Assistance and take advantage~~Class attendance and use):	***20***
o ~~Taking advantage of the t~~Theoretical classes (lectures)	10
o ~~Taking advantage of p~~Practical sessions~~classes~~	7,5
o ~~Taking advantage of~~ ECTS (monitoring activity)~~tutoring~~	2,5
• ~~Non-contact~~Homework activities (continuous evaluation):	***20***

** Insert as many rows as necessary. For instance, you can include one row for a partial exam and another for the final exam.

o Seminar: preparation, presentation and defense	10
o Laboratory work: elaboration, presentation and defense	10
Final ~~evaluation~~ assessment of knowledge (Theoretical exam) *:	***60***
• Theoretical knowledge	40
• Practical knowledge	10
• Knowledge of the seminars	5
• Knowledge of practical work	5

QC: Qualification Criteria (weighting of the evaluation criteria in the final quantitative qualification).

*** The theoretical exam must be passed to pass the course.**

Activities and evaluation instruments	
Face-to-face activity	
Theoretical sessions	- Attendance~~ssistance~~ and use by means of routine checks carried out at the end of the corresponding session.
Practical sessions	- Attendance~~ssistance~~ and evaluation of the practical training acquired through control at the end of each practical session.
ECTS Tutoring	- Attendance~~ssistance~~
	In the case of not being able to carry out the classroom activities during the academic year for reasons of force majeure: • • It will be evaluated based on the activities made to date if it represents more than a third of the total. • • It will be evaluated based on alternative non-contact activities, associated with theoretical sessions, practices and ECTS tutorials.
Off-campus activities	
Presentation and defense of ECTS seminars and works	Assessment of: • The document • Presentation • Defense of work
	In the case of not being able to carry out the classroom activities during the academic year for reasons of force majeure: • It will be evaluated by videoconference
Final exam	The exam will consist of three different parts: - About the theory, practice seminars and laboratory work: it will consist of 60-70 test questions and intermingled short questions. Test questions will only have one true answer; those questions answered in the wrong way will subtract ½ from the value of the question, that is, two wrong answers nullify a correct one. The short questions will deal with definitions, basic concepts of the subject, etc., and will be scored, in the case of being answered correctly, as a test-type question. To ~~overcome~~pass~~pass~~ the theoretical part, it is necessary to obtain a mark~~score~~ equal to or greater than 5 points on this exam.

Comentario [U2]: comentaban pepa que era mejor especificar menos. igual con ecir solo 60-70 questions es suficiente

	To be taken into account in the rest of activities, it is necessary to overcome~~pass~~ the theoretical part.
	In the case of not being able to develop the final face-to-face exam during the academic year for reasons of force majeure, it will be evaluated by: • *Periodic ~~O~~on ~~-~~line ~~periodic~~ questionnaires of the thematic blocks* • *Oral ~~evaluation~~ assessment by videoconference*

Alternatively, based on the RESOLUTION of November 25, 2016, DOE nº 236 of December 12, 2016, the student can choose the Single Assessment modality. To opt for this evaluation system, the student must fill out, sign and deliver to the EIA Secretariat, by registering, the application form that is available on the EIA website (Secretariat, administrative procedures), in the first three weeks of the semester. In this case, the exam will include theoretical and practical content and will preferably be oral.

Bibliography (basic and complementary)

Basic bibliography:

- Belitz H.D., Grosch W., Schieberle P. (2012). Food Chemistry. Springer
- - Fenema, O.R. (1996). Química de los Alimentos. Acribia. S. A. Zaragoza.
- - Günter, V., Gunter, J., Dieter, S., Wolfgang, S., Norbert, V. (1999). Elementos de Bromatología descriptiva. Acribia. S.A. Zaragoza.
- - Less, R. (1982). Análisis de los Alimentos. Métodos y analíticos y control de calidad. Acribia S.A. Zaragoza.
- - Primo, E. (1997). Química de los Alimentos. Síntesis. Madrid.
- - Robinson, D. S. (1991). Bioquímica y valor nutritivo de los Aliemtos. Acribia S. A. Zaragoza.

~~Further reading~~Complementary bibliography:

- - Huy, Y.H. (1991). Encyclopedia of food science and technology. John Whiley & Sons. Chichester.
- - Newton, D.E. (2009). Food Chemistry. Infobase Publishing. NY.
- - Ockerman, H.W. y Hansen, C.L. (1994). Industrialización de subproductos de origen animal. Acribia S.A. Zaragoza.
- - Sikorski, Z.E. (1994). Tecnología de los productos del mar. Acribia S.A. Zaragoza.
- - Varnam, A.L. y Sutherland, J.P. (1998). Carne y productos Cárnicos. Tecnología, Química y Microbiología. Acribia. S.A. Zaragoza.

Links to web pages~~Enlaces a páginas web~~:

- http://www.ua.es/es/servicios/juridico/aguas.htm
- http://www.alceingenieria.net/
- http://www.foodhaccp.com/indexcopy.html
- http://www.fao.org/docrep/T0845S/t0845s00.htm#Contents
- http://www.efsa.eu.int/
- http://www.feplac.com//Legislacion/legislacion06.htm
- http://europa.eu.int/comm/agriculture/foodqual/quali1_es.htm

- http://europa.eu.int/eur-lex/lex/JOYear.do?year=2004&ihmlang=es
- http://europa.eu.int/index_en.htm
- http://www.calidadalimentaria.com/
- http://www.juridicas.com/base_datos/
- http://www.feplac.com//Legislacion/legislacion06.htm
- http://www.scirus.com/srsapp/
- http://www.sciencedirect.com/
- http://pubs.acs.org/promo/iecr/tree.htmlAgencia Española de Seguridad Alimentaria y Nutrición (AESAN): http://www.aesan.msc.es/aesa
- Búsqueda de información toxocológica: http://www.busca-tox.com/
- Codex Alimentarius : www.codexalimentarius.net/
- European Food Safety Authority (EFSA) : www.efsa.europa.eu/
- European Food Information Resource Network (EuroFIR) : www.eurofir.net/index.asp?id=1
- European Food Internacional Council (EUFIC) : http://www.eufic.org/
- FAO (Organización de las Naciones Unidas para la Agricultura y la Alimentación): http://www.fao.org/
- Institute of Food Science and Technology (IFST) : http://www.ifst.org/
- Métodos para la detección de microorganismos: http://foodhaccp.com/index3.html

Ministerio de Medio Ambiente y Medio Rural y Marino (MARM) - Alimentación : http://www.mapa.es/es/alimentacion/alimentacion.htm

Código de campo cambiado

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Código de campo cambiado

Other resources and complementary materials

Prior to the exhibition, they will be provided with a summary of the topic that includes the main contents to be taught. These contents may be in PowerPoint, Word or any of them transformed into pdf format. For its disposal, it will be deposited within each thematic block in AVUEX and TEAMS, for which it will be necessary to briefly explain its use and how to register in the first weeks of class ~~It will be deposited within each thematic block in the moodle, for which it will be necessary to briefly explain its use and how to register during the first weeks of class.~~ In those cases where it is possible, practical assumptions or relevant news that appear and that allow greater applicability of the topic will be analyzed.

For this, ~~extension~~ complementary material can be used, both bibliographic and other documentation (~~ege.g.~~, web pages) that allow developing other ~~transversal~~ cross or specific competences of the degree. All this information will be available on the platform of the virtual campus moodle.