

Food Analysis and Quality Control

Code: 103245
ECTS Credits: 9

Degree	Type	Year	Semester
2501925 Food Science and Technology	OB	2	2

Contact

Name: Antonio José Trujillo Mesa
Email: toni.trujillo@uab.cat

Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

Approximately 1/4 of the course is taught in Catalan

Teachers

Victoria Ferragut Perez
María Manuela Hernandez Herrero
Montserrat Mor-Mur Francesch

Prerequisites

Although there are no official requirements, it is advisable that the student has completed Chemistry II, Food Products and Food Chemistry.

Objectives and Contextualisation

The subject of Analysis and Quality Control of Foods is closely related to Quality Systems and Environmental Management Tools that also belongs to the subject Quality Management. The purpose of this course is to provide students with the necessary basis and knowledge for the selection of food quality parameters and analytical techniques to apply to food quality control, including physico-chemical, microbiological and sensory analysis. In this sense, it is very important that they know the composition and characteristics of food, as well as different aspects of food chemistry related to the transformation, conservation and storage of food, knowledge that are collected in the subjects of Food Products and Food Chemistry.

Objectives of the subject:

- Introduce the student to the basic concepts of Analysis and Control Quality of Foods.
- Know the most important physical, chemical and sensory analysis used in food quality control and understand its basis.

- Know and be able to associate the different types of analysis to be carried out in foods (physicochemical, microbiological and sensory) based on their particular characteristics, composition and preservation.
- Be able to select the most appropriate analytical techniques for quality control of food according to the different methods studied, the needs of the industry and/or administration.
- Know how to interpret the meaning of the results obtained in the analysis carried out.

The teaching methodology and evaluation proposed in the guide may undergo some modification depending on the restrictions on attendance that the health authorities impose.

Competences

- Apply the principles of processing techniques and evaluate their effects on the quality and safety of the product.
- Apply the scientific method to resolving problems.
- Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
- Develop individual learning strategies and planning and organisation skills.
- Display knowledge of the physical, chemical, biochemical and biological properties of raw materials and foods.
- Search for, manage and interpret information from different sources.
- Select the appropriate analytical procedures (chemical, physical, biological and sensory) in accordance with the objectives of the study, the characteristics of the analytes and the fundamental principles of the technique.

Learning Outcomes

1. Apply the scientific method to resolving problems.
2. Communicate effectively with both professional and non-professional audiences, orally and in writing, in the first language and/or in English.
3. Define the fundamental principles of chemical, physical, biological and sensory analysis procedures.
4. Develop individual learning strategies and planning and organisation skills.
5. Identify and select suitable analysis methods in a specific context.
6. Identify predictable modifications taking place in food processing and storage in order to set the relevant quality parameters in a study.
7. Identify the properties that affect or determine quality factors in fresh and processed foods in order to select parameters for analysis.
8. Interpret findings from trials used in studies on quality.
9. Search for, manage and interpret information from different sources.

Content

Block I. Introduction to analysis and quality control

Concepts of analysis and quality control. Analysis of food sampling techniques, samples preparation and preservation.

Block II. Physical quality of food

Geometric properties, color, texture, rheology and functional properties.

Block III. Chemical quality of food

Analysis of total solids (moisture), lipids, proteins and non-protein nitrogenous substances, carbohydrates, mineral elements, vitamins and additives.

Block IV. Microbiological quality of food

Criteria for selecting the most characteristic microbiota according to the raw material and its processing.

Block V. Sensory quality of food

Definition and applications of sensory analysis. Bases of the development of sensory methods. General methodology. Selection of the type of tests. Statistical design.

PRACTICE PROGRAM

ACQA1. The laboratory of food analysis. Quality control of a vegetable canned food (4 h)

ACQA2. Sensory evaluation of food (4 h)

ACQA3. Quality control of an orange juice (4 h)

ACQA4. Quality control of honey (4 h)

ACQA5 Quality control of olive oils (4 h)

SEMINARS PROGRAM

PROBLEMS (ABP: learning based on problems and cases).

SACQA1. Resolution and discussion of block II problems (2 h)

SACQA2. Resolution and discussion of the problems block III (2 h)

SACQA3. Resolution and discussion of block IV problems (2 h)

ACQ4. Resolution and discussion of block problems V (2 h)

CASES (ABP: learning based on problems and cases).

SC1_ACQA. Presentation of cases and resolution of a model case (2 h)

SC2_ACQA. Follow-up of cases (1 h)

SC3_ACQA. Resolution and discussion of cases (8 h)

PRACTICES

SP-ACQA. Presentation and discussion of the practices results (2 h)

The seminars SC2_ACQA and SP_ACQA are special seminars (small groups).

Methodology

1) Theoretical classes

The student acquires the scientific knowledge of the subject by attending lectures (master classes) and complementing them with the personal study of the topics explained and the realization of exercises proposed by the professors. These classes are the activities in which less interaction is required of the student since they are conceived as a fundamentally unidirectional method of transmitting the knowledge of the teacher to the student.

2) (ABP: problem-based learning and cases) Seminars and Self-Learning Work

The seminars are designed to discuss and resolve doubts. A special seminar (small groups) of two hours per group of practices will be dedicated to present the results obtained by the students from the laboratory practices. Problems and cases related to the analysis and quality control of foods will be raised. The problems will be solved through seminars and they will follow the next scheme of work: the students will receive the problems related to the thematic blocks II, III, IV and V, they will solve them in groups, and in class they will be solved and discussed. The cases will be developed through this work scheme: presentation and resolution of a model case, presentation and assignment of the cases to be solved, follow-up of the cases, and resolution of the case by oral presentation, and delivery of the resolution memory of the case. These cases will be developed through different seminars.

3) Laboratory practices

The practical development of this subject will be done in groups at the laboratory. The objective of the practical classes will be to complete, apply and reinforce the knowledge acquired in the theoretical classes. The students will realize the practical sessions following a script that previously they will must read. The results will be discussed in a subsequent seminar by presenting and discussing the results by the students.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	20	0.8	3, 6, 8
Seminars	21	0.84	1, 2, 5, 6, 7, 8
Theoretical classes	38	1.52	3, 5, 6, 7
Type: Autonomous			
Evaluation	5	0.2	3, 4, 5, 6, 7, 8
Self-learning	66	2.64	1, 9, 2, 3, 4, 5, 6, 7, 8
Study	70	2.8	9, 3, 4, 5, 6, 7, 8

Assessment

The competences of this subject will be evaluated by:

- An individual control of the contents of blocks I + II + III (test or short questions), with a weight of 30% of the final grade
- Individual global control (exam type short or medium size written questions) where the knowledge acquired in solving the problems and cases, and the knowledge of all the blocks (IV) will be assessed together with the student's ability to relate all the theoretical and practical contents of the subject, with a weight of 30% of the final grade
- Self-learning work. The group of students that will present and defend the problems and cases proposed to be resolved will be evaluated. Each student will participate in the resolution of a series of problems and a case that will weigh 30% (15% problems and 15% case) of the final grade
- The evaluation of the practices will have a weight of 10% of the grade and will be carried out by group of practices through an oral presentation where the results of the practices carried out will be presented.

To pass the subject an average of 5 points (1-10 score) is requested, taking into account these minimums:

- a minimum of 5 points (1-10 score) in each of the controls; in case of undershoot this goal, one final examination test will be given by each trainee
- a minimum of 6 points (1-10 score) in cooperative activities
- students has not been presented to some of the controls, will be able to do it in the final examination (July) but in this case they will have to obtain a minimum grade of 6
- It is generally considered that a student is not evaluable if he has participated in evaluation activities that represent $\leq 15\%$ of the final grade

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Control of the contents of blocks I + II + III	30%	2	0.08	2, 3, 5, 6, 7, 8
Cooperative activities (ABP seminars and laboratory practices results).	40%	1	0.04	1, 9, 2, 3, 4, 5, 6, 7, 8

Bibliography

Alvarado, J. D., Aguilera, J. M. 2001. Métodos para medir propiedades físicas en industrias de alimentos. Ed. Acribia, Zaragoza.

Batt, C. A., & Tortorello, M. L. (2014). *Encyclopedia of food microbiology*. Elsevier/Academic Press,. <https://www.sciencedirect.com/science/referenceworks/9780123847331>

Bhunia, A. K. (2018). *Foodborne Microbial Pathogens*. Springer New York. <https://doi.org/10.1007/978-1-4939-7349-1>

Bibek., R.; Bhunia, A. K. (2010). *Fundamentos de microbiología de los alimentos*. McGraw-Hill Interamericana. México

Blackburn, C. de W. (2006). *Food spoilage microorganisms*. CRC Press. http://app.knovel.com/web/toc.v/cid:kpFSM00001/viewerType:toc/root_slug:food-spoilage-microorganisms/url_sl?

Bourne, Malcolm C. (2002). *Food Texture and Viscosity - Concept and Measurement (2nd Edition)*. Elsevier. <https://app.knovel.com/hotlink/toc/id:kpFTVCME06/food-texture-viscosity/food-texture-viscosity>

Caballero, Benjamin. (2003). *Encyclopedia of Food Sciences and Nutrition*. Academic Press. <https://doi.org/10.1016/B0-12-227055-X/00031-6>

Chandan, Ramesh C. Kilara, Arun Shah, Nagendra P. (2016). *Dairy Processing and Quality Assurance (2nd Edition)*. John Wiley & Sons. <https://app.knovel.com/hotlink/toc/id:kpDPQAE003/dairy-processing-quality/dairy-processing-quality>

Doyle, M. P., Diez-Gonzalez, F., & Hill, C. (Ed.). (2019). *Food Microbiology*. ASM Press. <https://doi.org/10.1128/9781555819972>

Downes, F.P.; Ito, K. (2002). *Compendium of methods for the microbiological examination of foods*. 4th ed. American Public Health Association, Washington.

Ducauze, C.J. (2006). *Fraudes alimentarios: legislación y metodología alimentaria*. Acribia, S.A. Zaragoza.

Erkmen, O., & Bozoglu, T. F. (Ed.). (2016). *Food Microbiology: Principles into Practice*. Wiley. <https://doi.org/10.1002/9781119237860>

Griffiths, Mansel W.. (2010). *Improving the Safety and Quality of Milk, Volume 1 - Milk Production and Processing*. Woodhead Publishing. <https://app.knovel.com/hotlink/toc/id:kpISQMVMP3/improving-safety-quality/improving-safety-quality>

Griffiths, Mansel W.. (2010). *Improving the Safety and Quality of Milk, Volume 2 - Improving Quality in Milk Products*. Woodhead Publishing. <https://app.knovel.com/hotlink/toc/id:kpISQMVIQ2/improving-safety-quality-2/improving-safety-quality-2>

Gruenwedel, D. W. y Whitaker, J.R. (1984). *Food Analysis. Principles and techniques*. Vol 1: Physical characterization. Ed. Marcel Dekker Inc, New York.

Immerseel, Filip Van Nys, Yves Bain, Maureen. (2011). *Improving the Safety and Quality of Eggs and Egg Products, Volume 2 - Egg Safety and Nutritional Quality*. Elsevier. Retrieved from <https://app.knovel.com/hotlink/toc/id:kpISQEEP01/improving-safety-quality/improving-safety-quality>

- International Commission on Microbiological Specifications for Foods (ICMSF). (2018). *Microorganisms in foods 7: Microbiological testing in food safety management*.
<https://link.springer.com/book/10.1007%2F978-3-319-68460-4>
- International Commission on Microbiological Specifications for Foods (ICMSF). (2001). *Microorganismos de los alimentos. 6, Ecología microbiana de los productos alimentarios*. Acribia. Zaragoza
- International Commission on Microbiological Specifications for Foods (ICMSF). (2004). *Microorganismos de los alimentos 7: Análisis microbiológico en la gestión de la seguridad alimentaria*. Editorial Acribia Zaragoza
- International Commission on Microbiological Specifications for Foods (ICMSF). (2011). *Microorganisms in Foods 8: Use of Data for Assessing Process Control and Product Acceptance*. Springer US,.
<https://dx.doi.org/10.1007/978-1-4419-9374-8>
- International Commission on Microbiological Specifications for Foods (ICMSF). (2016). *Microorganismos de los alimentos 8: Uso de datos para evaluar el control del proceso y la aceptación del producto*. Acribia, Zaragoza
- Jongen, W. (2002). *Fruit and Vegetable Processing - Improving Quality*. Woodhead Publishing.
<https://app.knovel.com/hotlink/toc/id:kpFVPIQ001/fruit-vegetable-processing/fruit-vegetable-processing>
- Jongen, W. (2005). *Improving the Safety of Fresh Fruit and Vegetables*. Woodhead Publishing.
<https://app.knovel.com/hotlink/toc/id:kpISFFV007/improving-safety-fresh/improving-safety-fresh>
- Kramer, A. y Twigg, B. (1983-84). *Quality control for the food industry*. Vols 1 y 2. Ed. Avi Publishing company inc, Westpor
- Lewis, M. J. 1994. *Propiedades físicas de los alimentos y de los sistemas de procesado*. Ed. Acribia, Zaragoza
- Lawless H.T. (2010). *Sensory Evaluation of Food. Principles and Practices*. Springer. Food Science Text Series. <https://link.springer.com/book/10.1007/978-1-4419-6488-5>
- Lawless H.T. (2013). *Laboratory Exercises for Sensory Evaluation*. Springer. Food Science Text Series. <https://link.springer.com/bookseries/5999>
- Matthews, K.R., Kniel, K.E., Montvill, T.J. (2017). *Food microbiology: An introduction*. ASM Press,.
<http://app.knovel.com/hotlink/toc/id:kpFMAIE017/food-microbiology-a>
- Multon, J. L. (1997). *Analysis of food constituents*. Wiley-VCH, New York, USA.
- Nielsen, S.S. (2008). *Análisis de los alimentos*. Acribia, Zaragoza.
- Nollet, Leo M. L.. (2012). *Handbook of Meat, Poultry and Seafood Quality (2nd Edition)*. John Wiley & Sons.
<https://app.knovel.com/hotlink/toc/id:kpHMPSQE02/handbook-meat-poultry/handbook-meat-poultry>
- Nys, Yves Bain, Maureen Immerseel, Filip Van. (2011). *Improving the Safety and Quality of Eggs and Egg Products, Volume 1 - Egg Chemistry, Production and Consumption*. Elsevier.
<https://app.knovel.com/hotlink/toc/id:kpISQEEP2/improving-safety-quality/improving-safety-quality>
- Pascual Anderson, M.R., Calderón y Pascual, V. (2000). *Microbiología alimentaria: metodología analítica para alimentos y bebidas*. Edició 2ª ed. Diaz de Santos, Madrid.
- Pomeranz, Y. y Meloan, C. (1994). *Food analysis. Theory and practice*. Chapman & Hall, New York.
- Raugel, P.J. (1999). *Rapid food analysis monitoring. Kits, instruments and systems*. Springer, Heidelberg.
- Rosenthal, A. J. 2001 *Textura de los alimentos: medida y percepción*. Acribia, Zaragoza.
- Shahidi, Fereidoon Simpson, Benjamin K.. (2004). *Seafood Quality and Safety - Advances in the New Millennium*. DESTech Publications.
<https://app.knovel.com/hotlink/toc/id:kpSQSANM03/seafood-quality-safety/seafood-quality-safety>

Singhal, R.S. Kulkarni, P.R. Rege, D.V.. (1997). *Handbook of Indices of Food Quality and Authenticity*. Woodhead Publishing.

<https://app.knovel.com/hotlink/toc/id:kpHIFQA00Q/handbook-indices-food/handbook-indices-food>

Sperber, W.H., y Doyle, M.P.(2009). *Compendium of the microbiological spoilage of food and beverages*. Springer, New York.

Stone, H. y Sidel, J.L. (2004). *Sensory Evaluation Practices (Third Edition)*. Elsevier Academic Press., San Diego, USA. Recurs electrònic: <http://www.sciencedirect.com/science/book/9780126726909>

Tham, Danielsson-Tham. M.L.. (2014). *Food associated pathogens*. CRC Press.,
<https://dx.doi.org/10.1007/978-1-4419-9374-8>

Electronic resources

AESAN (Agencia Española de Seguridad Alimentaria y Nutrición:

https://www.aesan.gob.es/AECOSAN/web/home/aecosan_inicio.htm

A.O.A.C. Official methods of analysis <http://www.eoma.aoac.org/>

Llibres electrònics <http://www.knovel.com/web/portal/browse/subject/60/filter/0/>

Science Direct <https://www.sciencedirect.com/>

Scopus <http://www.scopus.com/home.url>

Journal of Sensory Studies <https://onlinelibrary.wiley.com/journal/1745459x>

Journal of Food Composition and Analysis <http://www.sciencedirect.com/science/journal/08891575>

Journal of Food Quality <https://onlinelibrary.wiley.com/journal/17454557>

Websites of interest

Cereal and Grains Association (AACC) <https://www.cerealsgrains.org>

American Oil Chemists' Society (AOCS) <http://www.aocs.org/>

AOAC International <http://www.aoac.org>

Codex Alimentarius Commission <http://www.fao.org/fao-who-codexalimentarius/about-codex/es/>

Directorate General for Health & Consumers https://ec.europa.eu/info/departments/health-and-food-safety_en

European Food Safety Authority (EFSA) <http://www.efsa.europa.eu/>

Food Chemicals Codex <http://www.foodchemicalscodex.org/>

Food and Drug Administration (FDA) <http://www.fda.gov>

International Dairy Federation (IDF-FIL) <https://www.fil-idf.org/>

International Organization for Standardization (ISO) <https://www.iso.org/home.html>

The European Food Information Council (EUFIC) <https://www.eufic.org/es/>

Software

No software is used in this course.