# COURSE DESCRIPTION

## COURSE DETAILS

Title (of the course): **ANÁLISIS BROMATOLÓGICO**
Code: 102220
Degree/Master: **GRADO DE CIENCIA Y TECNOLOGÍA DE LOS ALIMENTOS** Year: 3
Name of the module to which it belongs: CIENCIAS DE LOS ALIMENTOS
Field: ANÁLISIS DE ALIMENTOS Y BROMATOLOGÍA
Character: OBLIGATORIA Duration: FIRST TERM
ECTS Credits: 6.0 Classroom hours: 60
Face-to-face classroom percentage: 40.0% Study hours: 90
Online platform: Moodle: https://moodle.uco.es/moodlemap/

## LECTURER INFORMATION

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## PREREQUISITES AND RECOMMENDATIONS

### Prerequisites established in the study plan

The students must have a B1-certificate in English to enrol in the subject.

### Recommendations

It is advisable that the students have a previous knowledge on Food chemistry analysis and Food Microbiology. Likewise, attendance to lectures is highly recommended in order to follow the subject appropriately.

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## INTENDED LEARNING OUTCOMES

| | |
|---|---|
| CB2 | Students must know how to apply their knowledge to their job or vocation in a professional manner and they must possess the competencies which are usually demonstrated by means of the elaboration and defense of arguments and the solution of problems in their field of study. |
| CB3 | Students must possess the capacity to gather and interpret relevant information (usually in their field of study) in order to give opinions which include a reflection about relevant topics which are social, scientific or ethic in nature. |
| CE3 | To know the techniques and perform food analyses that guarantee optimal conditions for human consumption. |
| CT11 | Ability for organization and scheduling. |
| CT14 | Sensitivity to environmental and social issues. |
| CT2 | Ability to solve problems. |
| CT5 | Ability to take decisions. |
| CT7 | Ability for analysis and synthesis. |
| CT8 | To develop a critical reasoning. |
| CU2 | To know and improve the user level in the field of ICT. |

## OBJECTIVES

During the development of the course, the student will know the main techniques of food analysis from different perspectives, such as food safety (microbiological analysis, analysis of chemical contaminants), and food and nutritional quality (analysis of the proximal composition, sensory, phytochemical analysis). Likewise, the student will know the quality requirements of laboratories of food analysis, certification, accreditation, etc., as well as other associated procedures such as sampling and preparation of samples for analysis.

The specific objectives of this subject are the following:

- To be able of differentiating the different types of samples and sampling, sample pretreatment and preparation and tuning of material and equipment in accordance with Good Laboratory Practices.
- To be aware of current Quality Management Systems in a laboratory of analysis.
- To know how to select the appropriate analytical methodology as a function of the food and purpose of the analysis, whether physical, chemical, microbiological or sensory essay, and to know their principles.
- To know the analytical techniques used for macronutrients in different food commodities.
- To know the most common analytical techniques used to detect the presence of toxins in food commodities, as well as natural chemical compounds beneficial for health.
-To know the principles of sensory analysis, the different sensory tests and interpretation of results.
- To know some of the most frequently used techniques of microbiological analyses and their objectives.
- To know how to report and interpret the results of food analyses.
- To be aware and learn to manage key literature sources on food analysis.

## CONTENT

### 1. Theory contents

1. Theory contents

**PART I. Quality management in analysis laboratories**

- Introduction to quality, implementation of quality systems in laboratories. Key policy references for quality systems, standardization, certification and accreditation. UNE-EN ISO/EC 17025 and 22000.
- Quality assessment: audits and accreditation of analysis laboratories.

**PART II. Introduction and sampling**

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- Introduction to food analysis. Concepts related to food analysis. Disorders in foods. Frauds.
- Sampling and preparation of analytical samples. Representativeness. Sampling methodology. Sampling procedure according to food state. Storage, transport and pre-treatment of samples for analysis.

**PART III. Analysis of main compounds in foods**

- Definition of moisture in foods. Drying methods: drying, balance, distillation. Analysis of water activity.
- Definition of lipids in food. Extraction and quantification methods. Analysis of the degree of deterioration of lipids in frying oil: peroxide index.
- Definition of nitrogen compounds in foods. Methods for the analysis of nitrogen compounds.
- Definition of carbohydrates in food. Methods for the analysis of carbohydrates. Analysis of polysaccharides, sugars in solution, total soluble carbohydrates and reducing sugars.
- Definition of dietary fiber in foods. Methods for the analysis of dietary fiber. Analysis of soluble and insoluble fractions.
- Definition of ash in foods. Analysis of the mineral contents. Determination of total ash. Wet and dry extraction methods.
- Definition of vitamins in foods. Methods for the analysis of vitamins.

**PART IV. Analysis of toxins, contaminants and phytochemicals**

- Analysis of toxins of biological origin. Mycotoxins, bacterial toxins and biogenic amines.
- Determination of chemical contaminants in foods. Pesticides, drugs residues, heavy metals.
- Analysis of compounds of interest in food: allergens and GMO.
- Phytochemicals in foods. Importance in food. Methods for the analysis of phytochemicals.

**PART V. Microbiological analysis of food**

- Principal techniques of microbiological analysis of food. Interpretation of results.
- Advances in microbiological analysis of food.

**PART VI. Sensory analysis of food**

- Definition of sensory analysis. Basic principles. Objectives. Sensory properties and attributes definition related to food properties.
- Types of sensory analysis. Discrimination, descriptive and affective tests.
- Development of sensory analysis. Education and training of judges. Sensory panels.
- Analysis and processing of sensory analysis data. Reporting.

## 2. Practical contents

Seminars (5h)

- Design of Standard Operating Procedures in laboratories and reporting. 2h
- Analytical references. Certified reference materials. 1h
- Microbiological analyses for specific purposes. Exposure and case resolution. 2h.

Laboratory Sessions (22h)

- Sensory analysis. Sensory panels. 4h
- Analysis of drinking water. 3h
- Analysis of meat products (I). 4h
- Analysis of fishery products (II). 3h
- Analysis of milk and dairy products (III). 4h
- Analysis of various compounds of interest in vegetable products. 4h

# SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

No poverty
Good health and well-being
Quality education
Gender equality
Affordable and clean energy

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Decent work and economic growth
Reduced inequalities
Climate action
Peace, justice and strong institutions
Partnerships for the goals

## METHODOLOGY

### General clarifications on the methodology (optional)

There is the possibility of performing industrial visits as well as visits to the Centralized Research facilities at the Rabanales Campus whenever the situation allows that.

### Methodological adaptations for part-time students and students with disabilities and special educational needs

Each particular case will be considered.

### Face-to-face activities

| Activity | Large group | Medium group | Small group | Total |
|---|---|---|---|---|
| *Assessment activities* | 3 | - | - | 3 |
| *Excursions* | 2 | - | - | 2 |
| *Lab practice* | - | - | 22 | 22 |
| *Lectures* | 28 | - | - | 28 |
| *Seminar* | - | 5 | - | 5 |
| ***Total hours:*** | ***33*** | ***5*** | ***22*** | ***60*** |

### Off-site activities

| Activity | Total |
|---|---|
| *Exercises* | 15 |
| *Information search* | 15 |
| *Reference search* | 15 |
| *Self-study* | 45 |
| ***Total hours*** | ***90*** |

## WORK MATERIALS FOR STUDENTS

Case studies
Dossier
Exercises and activities
Oral presentations

# COURSE DESCRIPTION

Placement booklet
References

## EVALUATION

| Intended learning | Exams | Placement reports | Problem solving |
|---|---|---|---|
| *CB2* | X | X | X |
| *CB3* | X | X | X |
| *CE3* | X | X | X |
| *CT11* | | X | X |
| *CT14* | | X | X |
| *CT2* | X | X | X |
| *CT5* | | X | X |
| *CT7* | X | X | X |
| *CT8* | X | X | X |
| *CU2* | | X | X |
| ***Total (100%)*** | ***60%*** | ***20%*** | ***20%*** |
| ***Minimum grade*** | ***5*** | ***5*** | ***5*** |

(*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

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**Method of assessment of attendance:**

A 10% increase in the final mark will be provided if attendance to theoretical lectures is > 80%.

**General clarifications on instruments for evaluation:**

Before the final exam date, information will be provided in relation to the structure of the exam, and the weights assigned to each part.

**Clarifications on the methodology for part-time students and students with disabilities and special educational needs:**

Each particular case will be considered.

**Clarifications on the evaluation of the extraordinary call and extra-ordinary call for completion studies:**

The final score will be calculated with the realization of a final exam, accounting for 60% of the final score and the completion of practical reports and resolution of questionnaires, problems and assignments. The practical part will account for the remaining 40% of the final score.

In case of not passing the course in one call, in the next call (ordinary or extraordinary) the student may attend all assessment instruments. The scores obtained in the exam will be valid till the end of the course 23-24, exclusively. Regarding the scores obtained in the practical part (Placement reports and Problems solving), they will be still valid for the course 24-25, if desired by the student. Otherwise, he/she has to repeat the practical part and the scores of the course 23-24 will be removed.

These criteria will apply for ordinary, extraordinary, and extraordinary calls for completion of studies.

**Qualifying criteria for obtaining honors:**

*To achieve an evaluation above 9. Active participation in class will be considered*

# BIBLIOGRAPHY

## 1. Basic Bibliography

**Basic bibliography**

*Adrian, J., Potus, J., Poiffait, A., Dauvillier, P. (2000). Análisis Nutricional de los Alimentos. Ed. Acribia, S. A. Zaragoza, España.*

*AENOR. (1997). Análisis sensorial. Tomo 1. Alimentación: Recopilación de Normas UNE. AENOR. Madrid, España.*

*AENOR. (2010). Análisis sensorial. 2ª edición, AENOR, Madrid, España.*

*AENOR. (2010). Microbiología de los alimentos. AENOR, Madrid, España.*

*Allaert Vandevenne, C., y Escola Ribes, M. (2003). Métodos de análisis microbiológico de los alimentos. Ed. Diaz de Santos, Madrid*

*Alvarado, J. de Dios, Aguilera, J.M. (2001). Métodos para medir propiedades físicas en Industrias de Alimentos. Ed. Acribia, S.A. Zaragoza.*

*Anzaldua-Morales A. (1994). La evaluación sensorial de los alimentos en la teoría y la práctica. Ed. Acribia, S. A., Zaragoza.*

*AOAC (1993). Methods of Analysis for nutrition labeling. Eds. Sullivan, D.M.; Carpenter, D.E., Arlington, VA, USA.*

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*Belitz, H.D., W. Grosch. (1997). Química de los alimentos, 2ª ed. Ed. Acribia, S.A., Zaragoza.*

*Briz Escribano, J.; García Fure, R. (2004). Análisis sensorial de productos alimentarios. Metodología y aplicación*

# COURSE DESCRIPTION

*a casos prácticos, 2ª ed. MAPA*
*Carpenter,R.P.,D.H. Lyon, T.A. Hasdell. (2002). Análisis sensorial en desarrollo y control de la calidad de los alimentos. Ed. Acribia S:A:, Zaragoza.*
*Chamorro M.C., Losada M.M. (2002). El análisis sensorial de los quesos. Ed. Mundi-Prensa. Madrid, España.*
*Chiralt Boix, A.; Martínez Navarrete, N.; González Martínez, C.; Talens Oliag, P.; Moraga Ballesteros,G. (2007). Propiedades físicas de los alimentos. Editorial Universidad Politécnica de Valencia.*
*Diario oficial de las Comunidades Europeas. (1998) Métodos oficiales de análisis en la Unión Europea. (1ª Ed.). Tomo I y II .Editorial: Ministerio Agricultura, Pesca y Alimentación, Madrid*
*Ducauze, Ch. J. (2006) Fraudes alimentarios. indicaciones reglamentarias y metodología analítica. Ed. Acribia, S. A. Zaragoza, España*
*Egan, H., R.S. Kirk, R. Sawyer. (1987). Análisis químico de alimentos de Pearson, 8ª ed., CECSA*
*Fennema, O .R. (2000). Química de los alimentos. Ed. Acribia, S.A., Zaragoza.*
*Harrigan, W.F. (1998) Laboratory Methods in Food Microbiology. 3era ed, London, Academic Press, London*
*Hart, F. Leslie, (1991). Análisis moderno de los alimentos", Ed. Acribia, S.A., Zaragoza.*
*Herschdoe G. (1989). The chem istry and technology of edible oils and fats and their high fat products. Academic Press.*
*Ibáñez F., Barcina Y. (2001). Análisis sensorial de alimentos: métodos y aplicaciones. Ed. Springer-Verlag. Barcelona, España.*
*ICMSF (1999) Métodos de muestreo para análisis microbiológicos: principios y aplicaciones específicas. Ed. Acribia SA, Zaragoza*
*ICMSF (2000) Su significado y métodos de enumeración. Ed. Acribia SA, Zaragoza*
*Instituto Nacional de Consumo. (1999). Métodos Analíticos del Laboratorio del Instituto Nacional del Consumo (CICC). Alimentos I. Ed. Ministerio de Sanidad y Consumo, Madrid, España.*
*Juran, J.M., A.B. Godfrey (2001). Manual de control de calidad, 5ª ed., McGraw-Hill, Madrid.*
*Kirsop B.E. y Doyle A. (1991) Maintenance of Microorganisms and Cultured Cells. A Manual of Laboratory Methods. 2da edición. Academic Press; London.*
*Koopmans M.P.G., Cliver, D.O. y Bosch, A. (2010). Virus De Transmisión Alimentaria: AVANCES Y RETOS. Ed. Acribia, S.A., Zaragoza*
*Lawless, H.T., H. Heym ann., H. Lawless. (1998). Sensory evaluation: principles and practices. Chapman & Hall, London.*
*Lees, R. (1982). Análisis de los alimentos. Métodos analíticos y de control de calidad. Ed. Acribia, S.A.. Zaragoza.*
*Lewis, M. J. (1993) Propiedades físicas de los alimentos y de los sistemas de procesado. Ed. Acribia, S.A. Zaragoza.*
*Madrid Vicente, A., (1994). Métodos Oficiales de Análisis de Los Alimentos. Ed. Mundi Prensa*
*Mafart, P. (1994) Ingeniería industrial alimentaria. Vol. 1. Procesos físicos de conservación. Ed. Acribia, S. A. Zaragoza.*
*Matissek, R.; Schnepel, F.M.; Steiner, G. (1998). Análisis de los alimentos. Fundam entos, métodos, aplicaciones. Ed. Acribia, S.A., Zaragoza.*
*Mu¨ller, G. (1981) Microbiología de los Alimentos Vegetales. Ed. Acribia, S.A., Zaragoza.*
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*Rosenthal, A.J. (2001). Textura de los alimentos. Medida y percepción. Ed. Acribia, S.A. Zaragoza, España.*
*Roudot, A.C. (2005). Reología y análisis de la textura de los alimentos. Ed. Acribia, S.A.,Zaragoza.*
*Sabater, J., A. Vilumara. (1988). Buenas prácticas de laboratorio (GLP) y garantía de calidad: principios*

# COURSE DESCRIPTION

*básicos. Díaz de Santos, S.A. Madrid.*
*Sagrado, S., Bonet, E., Medina, MªJ. y Martín, Y. (2005) Manual práctico de calidad en los laboratorios. Enfoque ISO 17025. Ed. AENOR, Madrid*
*Sahin, S. Y Gu¨lu¨m Sumnu, S. (2009) Propiedades físicas de los alimentos. Editorial Acribia, S.A., Zaragoza.*
*Sancho J., Bota E., De Castro J.J. (1999). Introducción al análisis sensorial de los alimentos. Edicions Universitat de Barcelona. Barcelona, España.*
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*Stone H., Sidel J.L. (1993). Sensory evaluation practices. Academic Press. California. EEUU.*
*Wang, S. (2014). Food Chemical Hazard Detection: Development and Application of New Technologies. Ed. Willey-Blackwell.*

### 2. Further reading

Additional information will be uploaded to Moodle during the course.

## COORDINATION CRITERIA

Common evaluation criteria
Common learning outcomes
Joint activities: lectures, seminars, visits ...
Tasks performance

### Clarifications

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.

## SCHEDULE

| Period | Assessment activities | Excursions | Lab practice | Lectures | Seminar |
|---|---|---|---|---|---|
| *1# Fortnight* | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 |
| *2# Fortnight* | 0,0 | 0,0 | 0,0 | 4,0 | 3,0 |
| *3# Fortnight* | 0,0 | 0,0 | 8,0 | 4,0 | 0,0 |
| *4# Fortnight* | 0,0 | 2,0 | 8,0 | 4,0 | 0,0 |
| *5# Fortnight* | 0,0 | 0,0 | 6,0 | 4,0 | 0,0 |
| *6# Fortnight* | 0,0 | 0,0 | 0,0 | 4,0 | 2,0 |
| *7# Fortnight* | 3,0 | 0,0 | 0,0 | 4,0 | 0,0 |
| **Total hours:** | ***3,0*** | ***2,0*** | ***22,0*** | ***28,0*** | ***5,0*** |

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