

MODULE	SUBJECT MATTER	YEAR	SEMESTER	CREDITS	TYPE
Food Science	Fundamentals of Food Science	1 st	2 nd	6	Mandatory
TEACHING STAFF ⁽¹⁾			ADDRESS, TELEPHONE NUMBER, EMAIL, ETC. DIRECCIÓN COMPLETA DE CONTACTO PARA TUTORÍAS (Dirección postal, teléfono, correo electrónico, etc.)		
<ul style="list-style-type: none"> Celia Monteagudo Sánchez. Group E Miguel Navarro Alarcón. Group C 			Department of Nutrition and Food Science, 3rd floor, School of Pharmacy, Office number: 318 and 320. Phone number: 958 249766 / 958 242841 email: celiams@ugr.es and nalarcon@ugr.es		
			TIMETABLE FOR TUTORIALS OR LINK TO WEBSITE		
			http://www.ugr.es/~nutricion/pdf/tutorias2021.pdf		
BELONGS TO UNDERGRADUATE DEGREE PROGRAMME			AND ALSO TO OTHER UNDERGRADUATE DEGREE PROGRAMMES		
Grado in Human Nutrition and Dietetics					
PREREQUISITES OR RECOMMENDATIONS (where applicable)					
Having studied the subject of General Chemistry					
BRIEF DESCRIPTION OF CONTENT (ACCORDING TO OFFICIAL VALIDATION REPORT)					
<ul style="list-style-type: none"> Classification, chemical composition and nutritive value of food. Physic-chemical and functional properties of food. Sensory analysis of food. Basic processes of food preparation, transformation and preservation Chemical and sensory analysis of food and beverages 					

¹ Consult any updates in Acceso Identificado > Aplicaciones > Ordenación Docente

(∞) This course guide should be filled in according to UGR regulations on assessment of student learning: ([http://secretariageneral.ugr.es/pages/normativa/fichasugr/ngc7121/!](http://secretariageneral.ugr.es/pages/normativa/fichasugr/ngc7121/))



GENERAL AND SPECIFIC COMPETENCES

- CG.2- To develop the profession with respect to other health professionals, acquiring teamwork skills.
- CG.3- To recognize the need to maintain and update professional competence, giving special importance to the autonomous and continuous learning of new knowledge, products and techniques in nutrition and feeding, as well as motivation for quality.
- CG.5- To carry out communication effectively, both orally and in writing, with people, health professionals or industry and the media, knowing how to use information and communication technologies, especially those related with nutrition and lifestyle habits.
- CG.6- To know, critically value and know how to use and apply information sources related to nutrition, food, lifestyles and health aspects.
- CG.8- Identify and classify foods and food products. Knowing how to analyze and determine its composition, its properties, its nutritional value, the bioavailability of its nutrients, organoleptic characteristics and the modifications they undergo as a result of technological and culinary processes.
- CB.1 - That the students have demonstrated to possess and understand knowledge in an area of study that starts from the general secondary education, and is usually found at a level that, although supported by advanced textbooks, includes also some aspects that involve knowledge from the forefront of their field of study
- CB.2 - That students know how to apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.
- CB.3 - That students have the ability to collect and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues.
- CB.4 - That students can transmit information, ideas, problems and solutions to a specialized and non-specialized audience
- CB.5 - That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.
- CE10. To identify and classify foods, food products, and food ingredients.
- CE11. Knowing its chemical composition, its physico-chemical properties, its nutritional value, its bioavailability, its organoleptic characteristics and the modifications food undergoes.
- CE12. To know the production systems and the basic processes in the elaboration, transformation and conservation of the main foods.
- CE13. To know and apply the foundations of bromatological and sensory analysis of food products.
- CE16. To know the culinary techniques to optimize the organoleptic and nutritional characteristics of food, with respect to traditional gastronomy.
- CE22. Scientific and technical advice on food products and their development. Evaluate compliance with said advice
- CT.2 - Ability to freely use ICTs (Information and communication technologies)

OBJECTIVES (EXPRESSED AS EXPECTED LEARNING OUTCOMES)

- To know what are the food groups, their main components and their nutritional value.
- To understand what processes and mechanisms affect food spoilage and how they can be prevented

DETAILED SYLLABUS

THEORY:

- Topic 1. . Introduction. Food Science. Concept. Objectives. Historical development. Current status and prospects. Food law. Concept of food. Classification of food. Novel foods: functional, transgenic, ecological



and dietetic products.

- Topic 2. Carbohydrates. General functions in foods. Bromatological classification. Properties in foods.
- Topic 3. Lipids. General functions in foods. Bromatological classification. Properties in foods.
- Topic 4. Protein. General functions in foods. Bromatological classification. Denaturation. Functional properties.
- Topic 5. Vitamins. General functions in foods. Structure and forms. Stability and forms of degradation.
- Topic 6. Minerals. General functions in foods. Speciation and food supplementation. Influence of processing on mineral content of foods.
- Topic 7. Bromatological study of water. Bromatological concept of water activity. Bromatological applications of water activity. Influence of the water activity in the food stability.
- Topic 8. Food alteration. Overview. Classification. Influencing factors.
- Topic 9. Lipid alteration. Chemical oxidation of lipids: substrates, regulatory factors and prevention. Enzymatic alterations of lipids: lipid oxidation by lipoxygenase, ketonic rancidity and hydrolytic rancidity. Reversion of edible oils. Polymerization of lipids.
- Topic 10. Other food alterations. Chemical browning: substrates, regulatory factors, prevention and effects. Enzymatic oxidation: substrates, responsible enzymes, reaction mechanism, prevention and effects. Other enzymatic alterations of food.
- Topic 11. Food additives. Overview. Definition of food additive and processing aid. Classification. Justification for the employment of food additives. Health risks associated with the use of additives. Toxic risk assessment consistent with the use of additives. EC directives and legal use of additives. Dyes. Flavor modifiers. Flavorings. Stabilizers of physical characters. Chemical preservatives.
- Topic 12. - Food preservation. General principles of food preservation. Physical methods of preservation. Applying of heat or cold to food preservation. Drying. Dehydration and lyophilization. Ionizing radiation. Applications. Thermal emerging technologies.
- Topic 13. - Chemical methods of preservation. Salting, smoking, brining, pickling. Natural chemical preservatives: vinegar, sugar and alcohol. Additives. Biological conservation. Combined methods: hurdle technology, cooking under vacuum (vide suos technology).
- Topic 14. Sensory properties of food. Introduction. The color of the food. The flavor of food. The smell of the food. The texture of food. The flavor of food.
- Topic 15. Basic principles of sensory analysis. Introduction. Concept. Objectives. Description of color, odor, flavor and texture.
- Topic 16. Food quality. Concept of quality. Quality in the food industry. Systems of quality assurance. Reference standards. Quality criteria. Evaluation of quality in food.
- Topic 17. Meat and meat products. Structure and chemical composition of the meat muscle. Post-mortem changes: influence of exercise on the maturation of the meat. Rigor mortis. Analytical criteria and health.
- Topic 18. Fish and fishery products. Species of fish consumption. Meaning in the diet. Composition. Seafood and shellfish consumption. Canned fish. Fish products. Analytical criteria and health.
- Topic 19. Eggs and egg products. Structure and chemical composition. Egg products. Analytical criteria and health.
- Topic 20. Milk and dairy products. Structure and chemical composition of the milk. Types of milk, fermented milks and modified milks. Analytical criteria and health. Milk from other animal species important for human consumption.
- Topic 21. - Cheese. Chemical composition. Classification. Analytical criteria and health.

PRACTICE:

Seminars/Workshops

- Seminar on food additives

Laboratory work



Session 1. General management laboratory. Learning to use volumetric glassware and necessary apparatus for the development of practices. Reminder of the fundamentals of the titrations to be used for calculations after food analysis performed: problem solving.

Session 2. Moisture in food. Determination of moisture in cooked ham and milk.

Session 3. Fat content in meat derivatives. Extraction by the Soxhlet method and determination of fat content. Identification of the fatty acid composition by gas chromatography.

Session 4. Carbohydrates. Determination of lactose in milk.

Session 5. Minerals. Assessment of water hardness, assessment of Ca²⁺ and Mg²⁺ + rating. Determination of phosphorus in milk.

Session 6. Food additives. Determination of natural dyes by thin layer chromatography. Determination of sulfites in white wine. Evaluation of nitrate content in ham.

Session 7. Alterations. Measuring the acidity of milk.

Session 8. Sensory analysis. Texture profile

BIBLIOGRAPHY

BASIC READING LIST

- Química de los alimentos, 2ª Edición. Belitz, H. D.; Grosch, W. Editorial Acribia, S. A. Zaragoza 1997.
- Alimentos: composición y propiedades. Astiasarán anchía, I; Martínez Hernández, J. A. Editorial McGraw-Hill Interamericana. Madrid 2000.
- Ciencia bromatológica: principios generales de los alimentos. Bello Gutiérrez, J. Editorial Díaz de Santos, S. A. Madrid 2000-
- Food chemistry, 4th revised and extended revision. H. D. Belitz, W. Grosch, P. Schieberle. Springer-Verlag, Leipzig, 2009.
- Química de los alimentos, 4ª edición. Baduí Dergal, S. Editorial Pearson, México, 2006.
- Nutrición y alimentación. Mataix, J. Editorial Ergon. Majadahonda (Madrid), 2009.
- Tratado de nutrición, 2ª edición: tomo I (Bases fisiológicas y bioquímicas de la nutrición) y tomo II (Composición y calidad nutritiva de los alimentos). GIL, A. Editorial Médica panamericana. Madrid, 2010.
- Química de los alimentos, 5ª edición. Baduí Dergal, S. Editorial Pearson, México, 2012
- Química de los alimentos.
- Belitz HD, Grosch W, Schieberle P., 4th ed. Ed. Springer Verlag, Leipzig 2012.
- Tratado de nutrición, 3ª edición: tomo I (Bases fisiológicas y bioquímicas de la nutrición) y tomo II (Composición y calidad nutritiva de los alimentos). GIL, A. Editorial Médica panamericana. Madrid, 2017.
- Nutrición y bromatología. Navarro Alarcón M, Oliveras López MJ, López García de la Serrana, H (2018). Editorial Técnica Avicem. Granada.
- Química de los alimentos 4ª edn. S. Damodaran, K. L. Parkin . Acribia, S. A.. Zaragoza, 2019.

COMPLEMENTARY READING

- Química de los alimentos, 2ª Edición. Fennema, O. R. Editorial Acribia, S. A. Zaragoza 2000
- Toxicología alimentaria. Camean, A.M.; Repetto, M. Editorial Díaz de Santos, Madrid, 2006.
- Química de los alimentos, 3ª Edición. Damodaran S., Parkin K. L., Fennema, O. R. Editorial Acribia, S. A. Zaragoza 2008

RECOMMENDED LINKS

- <http://www.nutricion.com> (listado por orden alfabético de temas de interés: alimentos, aditivos, etc..)



- <http://www.laisla.com/uned/unitaria/com> (valor energético de los alimentos, tablas de composición de los alimentos, facilita la descarga de ciertos programas, tablas de composición de alimentos, etc.)
- <http://www.biosearchlife.es/pb/home.jsp#> (aspectos sobre alimentos funcionales)
- <http://www.pulevasalud.com/ps/index.jsp>
- <http://www.puleva.es/pf/index.html>
- <http://www.nestle.es/web/index.asp>
- <http://www.AESAN>
- <http://www.EFSA>
- <http://www.institutohuevo.com>
- <http://www.carne>

TEACHING METHODOLOGY

- Master/ expository lesson
- Seminars and discussion and debate sessions
- Individual and group tutorials
- Laboratory work

ASSESSMENT (ASSESSMENT INSTRUMENTS, CRITERIA AND PERCENTAGE VALUE OF FINAL OVERALL MARK, ETC.)

- **EVALUATION OF THEORETICAL KNOWLEDGE.** There will be two eliminatory partial exams and / or a final that will count with 70% in the final grade, which will include short questions and / or questions of development of the theoretical knowledge of the subject. It is necessary to achieve at least 40% of the theoretical knowledge grade, in each of the two parts in which the subject is divided (4 points out of 10 in each part), to average with the grades obtained in the evaluation of practical knowledge and bibliographic review work.
- **EVALUATION OF LABORATORY WORK.** It is compulsory to carry out laboratory practices to pass the subject, being essential to attend all of them and pass them through a written test, which will consist of 3 or 4 questions and 1 problem. Likewise, the preparation and delivery of the practice script with the results obtained on the day of the practice exam is mandatory, for correction and consideration. The practices represent 20% of the final grade obtained.
- **BIBLIOGRAPHIC REVIEW WORK (SEMINARS).** It is mandatory and will deal with several of the topics included in the program developed as a seminar and developed in groups of students. The evaluation of said work supposes 10% of the final grade and includes its individual and / or group preparation, its presentation and its presentation and defense in class.
- The work will be done in groups of 5 students, according to the order of the list. There will be a presentation and public defense, with the proposal of a series of questions related to it by the teacher. Also, it will be submitted to debate with the rest of colleagues. It will also be delivered in writing to the teacher for her grade.
- **CLASS ATTENDANCE.** Additionally, regular class attendance will be considered positively

DESCRIPTION OF THE EXERCISES WHICH WILL CONSTITUTE SINGLE FINAL ASSESSMENT AS ESTABLISHED IN UGR REGULATIONS

- In accordance with the regulations of "Evaluation and qualification of students" of the University of Granada, a final single evaluation will also be carried out, the request of which will be sent to the Director of the department within 2 weeks from the date of the student's enrollment in The subject. It will consist of a theoretical part (75% of the final grade) and a practical part (25% of the final grade). To pass the course, the student must have passed both parts. The theoretical exam will include development questions and / or short of the syllabus included in the teaching guide of the subject. The practical exam will consist of a



practical part, to be carried out in the practice laboratory of the department in the days following the completion of the theoretical exam, and will consist of the development of a complete practice included in the practical script (70% of the qualification of the practices) plus an additional theoretical part of the remaining practices collected in the referred script (30% of the qualification of the practices).

SCENARIO A (ON-CAMPUS AND REMOTE TEACHING AND LEARNING COMBINED)

TUTORIALS

TIMETABLE

(According to Official Academic Organization Plan)

<http://www.ugr.es/~nutricion/pdf/tutorias2021.pdf>
Request an appointment.

TOOLS FOR TUTORIALS

(Indicate which digital tools will be used for tutorials)

- PRADO 2, UGR email, GOOGLE MEET

MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

- Classes will be taught face-to-face and / or virtual, using GOOGLE MEET's videoconferencing tools, respecting the same schedule that appears in the Teaching Guide for this subject.
- The most relevant teaching material used in virtual classes will be available on the PRADO platform, as well as other resources that the teacher considers important to complement the student's training.
- The tutorials, queries and clarifications may be done in person in the teachers' offices and / or using the PRADO platform, GOOGLE MEET and the email of the Ugr.
- Face-to-face and / or virtual practices through google meet.

MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

Ordinary assessment session

- In-person exam in principle. If this is not possible, the PRADO platform tool will be used to carry out the exam.
- In the continuous evaluation system followed in the teaching of the subject, as part of the ordinary call, it will include the completion of a partial exam with 2 parts: the first part will consist of between 30-50 test questions (with 4 options and only one correct, and with 60 seconds to answer each of the questions); The second part will consist of essay-type development questions (3-5 questions) with between 10-15 min for your answer. Each part will have a rating of 5 points. The partial exam is eliminatory by obtaining 5 points out of 10.
- Description: objective test with final exam of the entire syllabus of the subject, which will consist of 30-50 questions, with four options and a single correct answer, with randomization in the order of appearance of both the questions and the options for each student (will be worth 5 points). In addition, it will also include essay-type development questions (3-5 questions) that will also be worth 5 points.
- Those students who have not passed the partial exam, will be examined of all the matter in the established ordinary call.
- In the evaluation of practical knowledge, a test with characteristics similar to those described above will be carried out, but with a number of questions between 10-20 and the resolution of problems, as well as questions related to knowledge of the fundamentals, techniques and reagents and their functions in the development of practices.
- Evaluation criteria: the score obtained in the exam of the ordinary call will be averaged with the qualification of internships and self-employment, provided that it is greater than or equal to 4 points out of



10, in each of the parts.

- Percentage on final grade: exam of theoretical knowledge (70% of the total grade); realization and examination of practical knowledge (20% of the total grade); preparation of group work and presentation (10% of the total grade).
- Regular attendance at classes, whose control will be done in person or through the PRADO platform, will count positively in the final assessment

Extraordinary assessment session

- In-person exam in principle. If it is not possible to use the PRADO 2020 Platform tool, to carry out the exam.
- Description: the first part (it will be worth 5 points) will include an objective test with a final exam of the entire syllabus of the subject, which will consist of between 30-50 questions, with four options and a single correct answer (with randomization in the order of appearance of both the questions and the options for each student, and limitation of time to 60 seconds per question and with no possibility of return); The second part will consist of essay-type development questions (3-5 questions) that will also be worth 5 points.
- Those students who did not pass the practical knowledge exam will repeat a test with characteristics similar to those described above, but with a number of questions between 10-20 and problem solving, as well as questions related to knowledge of the fundamentals, techniques and reagents and their functions in the development of practices.
- Evaluation criteria: the score obtained in the exam of the ordinary call will average with the qualification of practices, provided that it is greater than or equal to 4 points out of 10, in each of the parts.
- Percentage on final grade: exam of theoretical knowledge (70% of the total grade); realization and examination of practical knowledge (20% of the total grade); preparation of group work and presentation (10% of the total grade). If the student does not want the grades obtained in practices and autonomous work (approved during the course of the academic year) to be computed, the grade would be obtained from the grade obtained in the theoretical knowledge exam

Single final assessment

- In-person exam in principle. If it is not possible to use the PRADO 2020 Platform tool, to carry out the exam.
- Tool: PRADO 2020
- Description: the first part (it will be worth 5 points) will include an objective test with a final exam of the entire syllabus of the subject, which will consist of between 30-50 questions, with four options and a single correct answer (with randomization in the order of appearance of both the questions and the options for each student, and limitation of time to 60 seconds per question and with no possibility of return); The second part will consist of essay-type development questions (3-5 questions) that will also be worth 5 points.
- As part of the ordinary call, there will be a partial examination of the same characteristics established above, with an eliminatory character as of the obtaining of 5 points.
- Additionally, despite not having carried out the practices of the subject, the students will have the opportunity to examine the practical knowledge, according to what is established in the ordinary call for this exam.
- Assessment criteria: the score obtained in the exam of the final non-face-to-face assessment call, will be averaged with the practical qualification, provided that it is greater than or equal to 4 points out of 10, in each of the parts.
- Percentage on final grade: exam of theoretical knowledge (80% of the total grade); realization and examination of practical knowledge (20% of the total grade).



SCENARIO B (ONCAMPUS ACTIVITY SUSPENDED)

TUTORIALS

TIMETABLE

(According to Official Academic Organization Plan)

<http://www.ugr.es/~nutricion/pdf/tutorias2021.pdf>
Request an appointment.

TOOLS FOR TUTORIALS

(Indicate which digital tools will be used for tutorials)

- PRADO 2, UGR email, GOOGLE MEET

MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

- Classes will be taught face-to-face and / or virtual, using GOOGLE MEET's videoconferencing tools, respecting the same schedule that appears in the Teaching Guide for this subject.
- The most relevant teaching material used in virtual classes will be available on the PRADO platform, as well as other resources that the teacher considers important to complement the student's training.
- The tutorials, queries and clarifications may be done in person in the teachers' offices and / or using the PRADO platform, GOOGLE MEET and the email of the Ugr.
- Face-to-face and / or virtual practices through google meet.

MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

Ordinary assessment session

- In-person exam in principle. If this is not possible, the PRADO platform tool will be used to carry out the exam.
- In the continuous evaluation system followed in the teaching of the subject, as part of the ordinary call, it will include the completion of a partial exam with 2 parts: the first part will consist of between 30-50 test questions (with 4 options and only one correct, and with 60 seconds to answer each of the questions); The second part will consist of essay-type development questions (3-5 questions) with between 10-15 min for your answer. Each part will have a rating of 5 points. The partial exam is eliminatory by obtaining 5 points out of 10.
- Description: objective test with final exam of the entire syllabus of the subject, which will consist of 30-50 questions, with four options and a single correct answer, with randomization in the order of appearance of both the questions and the options for each student (will be worth 5 points). In addition, it will also include essay-type development questions (3-5 questions) that will also be worth 5 points.
- Those students who have not passed the partial exam, will be examined of all the matter in the established ordinary call.
- In the evaluation of practical knowledge, a test with characteristics similar to those described above will be carried out, but with a number of questions between 10-20 and the resolution of problems, as well as questions related to knowledge of the fundamentals, techniques and reagents and their functions in the development of practices.
- Evaluation criteria: the score obtained in the exam of the ordinary call will be averaged with the qualification of internships and self-employment, provided that it is greater than or equal to 4 points out of 10, in each of the parts.
- Percentage on final grade: exam of theoretical knowledge (70% of the total grade); realization and examination of practical knowledge (20% of the total grade); preparation of group work and presentation (10% of the total grade).
- Regular attendance at classes, whose control will be done in person or through the PRADO platform, will



count positively in the final assessment

Extraordinary assessment session

- In-person exam in principle. If it is not possible to use the PRADO 2020 Platform tool, to carry out the exam.
- Description: the first part (it will be worth 5 points) will include an objective test with a final exam of the entire syllabus of the subject, which will consist of between 30-50 questions, with four options and a single correct answer (with randomization in the order of appearance of both the questions and the options for each student, and limitation of time to 60 seconds per question and with no possibility of return); The second part will consist of essay-type development questions (3-5 questions) that will also be worth 5 points.
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- Evaluation criteria: the score obtained in the exam of the ordinary call will average with the qualification of practices, provided that it is greater than or equal to 4 points out of 10, in each of the parts.
- Percentage on final grade: exam of theoretical knowledge (70% of the total grade); realization and examination of practical knowledge (20% of the total grade); preparation of group work and presentation (10% of the total grade). If the student does not want the grades obtained in practices and autonomous work (approved during the course of the academic year) to be computed, the grade would be obtained from the grade obtained in the theoretical knowledge exam

Single final assessment

- In-person exam in principle. If it is not possible to use the PRADO 2020 Platform tool, to carry out the exam.
- Tool: PRADO 2020
- Description: the first part (it will be worth 5 points) will include an objective test with a final exam of the entire syllabus of the subject, which will consist of between 30-50 questions, with four options and a single correct answer (with randomization in the order of appearance of both the questions and the options for each student, and limitation of time to 60 seconds per question and with no possibility of return); The second part will consist of essay-type development questions (3-5 questions) that will also be worth 5 points.
- As part of the ordinary call, there will be a partial examination of the same characteristics established above, with an eliminatory character as of the obtaining of 5 points.
- Additionally, despite not having carried out the practices of the subject, the students will have the opportunity to examine the practical knowledge, according to what is established in the ordinary call for this exam.
- Assessment criteria: the score obtained in the exam of the final non-face-to-face assessment call, will be averaged with the practical qualification, provided that it is greater than or equal to 4 points out of 10, in each of the parts.
- Percentage on final grade: exam of theoretical knowledge (80% of the total grade); realization and examination of practical knowledge (20% of the total grade).

ADDITIONAL INFORMATION (if necessary)

