(*)Facultade de Química

Presentation

The studies of Chemistry have a large tradition at the University of Vigo, where it has been taught during more than 30 years. The stablisment of the Universitary System of Galicia in the 90s and the current process of implantation of the European Space of Higher Education (EEES) modified the offer of degrees, but no the pioneering spirit of the chemists in research of in the quest for a better service to the society.

Degrees given in the Faculty

Degree in Chemistry

- Masters And Doctorates:
  - Industry and Chemical Research and Industrial Chemistry
  - Theoretical chemistry and Computational Modelling
- Master:
  - Science and Technology of Conservation of Fishing Products

Web page

Information about the Faculty of Chemistry:

http://quimica.uvigo.es

Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca

Subjects

Year 1st

Code	Name	Quadmester	Total Cr.
V11M085V02104	Marine species of commercial interest. Biology, parasitology and microbiology. Species identification	1st	3
V11M085V02105	Food safety and quality. Hygiene, toxicology and food legislation. Risks prevention	1st	3

V11M085V02106	Chemical analysis of fishery products. Biotic and abiotic contaminants. Quality control in the laboratory.	1st	3
V11M085V02107	Environmental aspects	1st	3
V11M085V02108	Business and social aspects	1st	3
V11M085V02205	Cold Storage: Freezing and Refrigeration Procedures and Technologies	2nd	5
V11M085V02206	Conservation by heat: Canned opening and pasteurized	2nd	5
V11M085V02301	Physical and Chemical Treatments	2nd	3

Year 2nd			
Code	Name	Quadmester	Total Cr.
V11M085V02303	Quality of fishery and aquaculture products	1st	5
V11M085V02304	Food security of fishery and aquaculture products	1st	5

Year 1st			
Code	Name	Quadmester	Total Cr.
V11M085V02402	Product Innovation and Process	2nd	3

Year 2nd			
Code	Name	Quadmester	Total Cr.
V11M085V02405	Internships	2nd	9
V11M085V02406	Final Dissertation	2nd	10

IDENTIFYING DATA

Marine species of commercial interest. Biology, parasitology and microbiology. Species identification

Subject	Marine species of commercial interest. Biology, parasitology and microbiology. Species identification			
Code	V11M085V02104			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Combarro Combarro, María del Pilar Crespo González, Celia García Estévez, José Manuel González González, Ángel Francisco Iglesias Blanco, Raúl Longo González, María Asunción Santaclara Norés, Francisco Javier Vázquez Otero, María Elsa			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	The objective of this course is to know and differentiate the main fishing and aquaculture species of interest in our country, as well as describing the nutritional values of fishery products. The aim is to know and understand the fundamental aspects of the biology of fish and cephalopods and the basic aspects of bivalve and crustacean biology, as well as acquiring basic knowledge about parasitology of fishery products. Also, the alteration of the fishing products and the factors that influence their quality will be evaluated, studying the microbiology of fishery products and the basic aspects of the techniques of species identification by DNA analysis.			

Training and Learning Results

Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C1	Know and differentiate the main fishing and aquaculture species of commercial interest in our country, with its main biological characteristics.
D4	Creativity, initiative and entrepreneurial spirit.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results

That students know how to identify marine species of commercial interest.	A1 A3 B1 C1 D4
That the students know the biology of the different fish, cephalopods, molluscs, bivalves and crustaceans.	A3 A5 B4 C1 D4
That students know how to differentiate marine parasites of economic and sanitary importance.	A1 A5 B1 C1 D5
That the students know the pathogenic microorganisms and the norms that guarantee consumer health.	A1 A3 B1 C1 D4 D5

Contents
Topic
Lesson 1. Marine species of commercial interest. Introduction.
Lesson 2. Biology of fish and cephalopods.
Lesson 3. Biology of bivalve molluscs and crustaceans.
Lesson 4. Basic parasitology. Parasitology of fish, bivalves and cephalopods.
Lesson 5. Marine parasites of economic and health importance (zoonoses). Anisakis and Pseudoterranova. Parasites as biological markers.
Lesson 6. Microorganisms present in fishery products. Origin and factors influencing the fish microbiota.
Lesson 7. Pathogenic microorganisms: standards to guarantee consumer health.
Lesson 8. Species identification.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	16	40	56
Case studies	4	7	11
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance	
Methodologies	**Description**
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.

Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1	B1 B4	C1	D4
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20		B1 B4	C1	D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A1 A3 A5	B1 B4	C1	D4 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A1 A3 A5	B1 B4	C1	D4 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

Michael J. Leboffe and Burton E. Pierce.Morton, **A photographic Atlas for Microbiology Laboratory**, Pub. Co.,

J.G. Capuccino and N. Sherman., **Microbiology. A laboratory Manual**, 6ª edición. Benjamin/Cummings Company Inc,

Doyle, M.P., F. Diez-Gonzalez, C. Hill, **Food Microbiology: Fundamentals and Frontiers**, 5ª ed, ASM Press, 2019

Leboffe, M.J., B.E. Pierce, **Microbiology Laboratory Theory & Application**, 4ª ed, Morton Publishing Company, 2015

Leboffe, M.J., B.E. Pierce, **A Photographic Atlas for the Microbiology Laboratory**, Morton Publishing Company, 2021

Rigel, N., **Laboratory Exercices in Microbiology**, 12ª ed, McGraw-Hill Higher Education, 2022

Waite-Cusic, J.G., A. E. Yousef, J. J. Perry, **Food Microbiology**, 2ª ed, Willey, 2022

Complementary Bibliography

Case, J.., **Laboratory Experiments in Microbiology**, 7ª ed. Pearson Benjamin,

http://www.ufrgs.br/para-site/taxono.htm, **Atlas Electrónico de Parasitología**,

http://planeta.terra.com.br/educacao/parasitepics/#protozoa,

http://martin.parasitology.mcgill.ca/JIMSPAGE/WORLDOF.HTM, **The World of parasites**,

http://www.biosci.ohio-state.edu, **Directorio de Parasitología**,

http://www.ent.iastate.edu/imagegallery, **Galería Entomológica de la Iowa state University**,

http://www.med-chem.com/Para/index.htm, **Paras-site Online**,

http://bumc.bu.edu/medicine, **Web Page de Zoonosis**,

http://cvm.msu.edu/courses/mic569/docs/parasite/index.html, **Identificación de parásitos por internet**,

http://www.parasitology.org.uk, **British Society for Parasitology**,

http://cal.vet.upenn.edu/parav/labs, **Imágenes de parásitos**,

 Macho G, Molares J. & Vázquez E., **Timing of larval release by three barnacles from NW Iberian Peninsula**, Marine Ecology Progress Series 298, 251-260.,

 Primo C. & Vázquez E., **Zoogeography of the Southern Africa Ascidian Fauna.**, Journal of Biogeography 31, 1987-2009,

 Bellas J., Beiras R. & Vázquez E., **A standardisation of Ciona intestinalis (Chordata, Ascidiacea) embryo-larval bioassay for ecotoxicological studies**, Water Research 37, 4613-4622,

 Vázquez E. & Young C.M., **Responses of compound ascidian larvae to haloclines.**, Marine Ecology Progress Series 113, 179-190.,

 Young C.M., Vázquez E., Metaxas A. & Tyler P.A, **Embryology of Vestimentiferan Tube Worms from Deep-sea Methane/Sulfide Seeps**, Nature 381, 514-516.,

Capuccino, J.G., N. Sherman, **Microbiology. A laboratory Manual**, 12ª ed, Benjamin/Cummings Company Inc., 2019

Johnson, T.R., C.L. Case, **Laboratory Experiments in Microbiology**, 12ª ed, Pearson, 2019

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Food safety and quality. Hygiene, toxicology and food legislation. Risks prevention				
Subject	Food safety and quality. Hygiene, toxicology and food legislation. Risks prevention			
Code	V11M085V02105			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Formoso Estévez, María Lorena Longo González, María Asunción Pérez Santiago, Alfonso Manuel Ruiz Blanco, Carlos S.			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	Through the study of this subject, the student is expected to be able to analyze the evaluation of toxic risk through the identification of dangers and the evaluation of exposure to toxic substances through the intake of foods of marine origin, as well as manage a food crisis. To this end, the agenda of this subject will address various issues on: physical-chemical-biological parameters of the characterization of the quality of foods of marine origin, the basic principles of General Toxicology, and Food Safety, and the application of the same to fishery products (studying the toxicology of marine toxins, metals, emerging toxic agents, etc.), and the current regulations on these issues and on occupational risk prevention in the fishing and canning industries.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C2	Know the parameters of safety and characterization of the quality of fishery products, as well as their possible toxicological risks, and the legislation applicable to such products.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
That the students acquire the knowledge of quality control of fishing and aquaculture products.	A1 A2 B1 B4 C2 D1 D2

That students know the principles of toxicology: marine toxins, metals, toxic agents, etc.	A1 A4 B1 B4 C2 D1 D2
That students know the aspects of chemical and biological safety in foods of marine origin.	A1 A2 A4 B1 B4 C2 D1 D2
For students to develop hazard identification and food safety limits skills.	A1 A4 B1 B4 C2 D2 D5
That the students know the legislation related to the quality of the products of the fishing and the aquaculture, as well as risk prevention.	A1 A2 B1 C2 D2 D5

Contents	
Topic	
1.-Quality control parameters of fishery and aquaculture products according to EU regulations.	(*)
2.-Principles of General Toxicology	(*)
3.-Chemical and biological safety in foods of marine origin: marine toxins, metals, emerging toxic agents, etc.	(*)
4.-Characterization of food risk through the identification of hazards and the evaluation of exposure to toxins through food intake. Security limits. Parameters used in food safety.	(*)
5.-Crises related to food security. Rapid alert system, crisis management and emergency situations. Food toxicological surveillance. European, national and regional organizations related to food safety.	(*)
6.-Legislation relating to the quality of fishery and aquaculture products.	(*)
7.-Prevention of occupational hazards in industries related to fishing and aquaculture products.	(*)

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	16	40	56
Case studies	4	7	11
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description

Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1 B4	B1	C2	D1 D2
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A2 A4	B1 B4	C2	D1 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A1 A4	B1 B4	C2	D1 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A1 A4	B1 B4	C2	D1 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

Stine, K.E.Ç Brown, T.M., **Principles of Toxicology**, 3ª,

Shibamoto, Takayuki, **Introduction to food toxicology**, 2ª,

Cabaleiro Portela, Víctor Manuel, **Prevención de riesgos laborales: normativa de seguridad e higiene en el puesto de trabajo**,

Complementary Bibliography

Botana, L. M.; Alfonso, A., **Phycotoxins. Chemisyry and Biochemistry**, 2ª,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Chemical analysis of fishery products. Biotic and abiotic contaminants. Quality control in the laboratory.				
Subject	Chemical analysis of fishery products. Biotic and abiotic contaminants. Quality control in the laboratory.			
Code	V11M085V02106			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Figueiredo Gonzalez, Maria Gago Martínez, Ana Leao Martins, Jose Manuel Longo González, María Asunción Pérez Cid, Benita			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	This course is intended for students to acquire the necessary knowledge about the chemical composition and nutritional aspects of fishery and aquaculture products. Likewise, aspects related to the analysis of biotic and abiotic contaminants (heavy metals, marine biotoxins, biogenic amines, etc.) in them will be delved into, indicating the most appropriate analytical methodology in each case and the basic tools that allow data to be obtained. quality in the laboratory.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B5	That the students develop the abilities of teamwork, enriched by the pluridisciplinarity.
C3	Acquire basic knowledge about laboratory analytical control of fishery products, including the biotic and abiotic contaminants potentially present in them.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
That students know the chemical composition and nutritional aspects of fishery products and aquaculture.	A1 B1 C3 D1 D2
That the students know the techniques of atomic and chromatographic spectroscopy in the analysis of fishing products	A4 B1 B5 C3 D2

That the students know the biotic and abiotic contaminants and their analysis.	A4 A5 B1 C3 D1 D5
That the students know the metallic toxins, amines and marine biotoxins and their analysis.	A1 A4 B5 C3 D1 D2
That the students know the quality control in an analytical laboratory, reference materials and validation.	A4 A5 B5 C3 D2 D5

Contents	
Topic	
1. Chemical composition and nutritional aspects of fishery and aquaculture products.	(*)
2. The analytical process of decision making and experimentation to consider. Analytical methodology.	(*)
3. Biotic and abiotic contaminants and their analysis.	(*)
4. Metallic toxins: speciation and analysis.	(*)
5. Biogenic amines and their analysis.	(*)
6. Marine biotoxins and their analysis.	(*)
7. Quality control in the analytical laboratory. Reference materials. Validation.	(*)
(*)TEMA 8. Técnicas cromatográficas acopladas a espectrometría de masas.	(*)*

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	16	40	56
Case studies	4	7	11
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance	
Methodologies	**Description**
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1 A4	B1	C3	D1 D2
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A4 A5	B5	C3	D2 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A4 A5	B1 B5	C3	D1 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A4 A5	B1 B5	C3	D1 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

Ruiter A., **El pescado y los productos derivados de la pesca: composición, propiedades nutritivas y estabilidad**, Ed. Acribia,

Valcarcel M, **Principios de Química Analítica**, Springer-Verlag Ibérica, Barcelona.,

Ashurst P.R., Dennis M.J., **Analytical Methods of Food Authentication**, Black Academic and Professional, London.,

Watson, D.H., **Natural Toxicants in Food**, Academic Press,

Complementary Bibliography

Sorensen H., Sorensen S. (, **Chromatography and capillary electrophoresis in food analysis,**, Royal Society of Chemistry, London,

Ebdon L., Pitts L., Cornelis R., Crews H., Donard O.F.X., Quevauviller Ph., **Trace Element Speciation for Environment Food and Health**, Royal Society of Chemistry, UK,

D'Mello J.P.F., **Food Safety: Contaminants and Toxins**, CABI Publishing, USA.,

Campañó Beltrán R., Ríos A, **Garantía de la calidad en los laboratorios analíticos,**, Ed. Síntesis, Madrid,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA

Environmental aspects

Subject	Environmental aspects			
Code	V11M085V02107			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción Canosa Saa, José Manuel			
Lecturers	Cameselle Fernández, Claudio Canosa Saa, José Manuel Longo González, María Asunción Pereiro Estévez, Ana Belén Torres Ayaso, Ana Belén			
E-mail	mlongo@uvigo.es jcanosa@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	This subject deals with the study of the environmental aspects of the treatment of gaseous, liquid and solid effluents, of industrial processes in general and of the fishery product processing sector in particular. To this end, the different techniques (unit operations) involved in these treatment processes are presented from an engineering point of view: their basics and physical, chemical and/or biological characteristics, unit design parameters and their application in environmental engineering. Practices on the studied concepts are carried out. and the legislative aspects of waste management are also considered.			

Training and Learning Results

Code	
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B2	That students develop oral and written communication skills in the two co-official languages of autonomy (Spanish and Galician).
B5	That the students develop the abilities of teamwork, enriched by the pluridisciplinarity.
C4	Know the main environmental aspects that affect the processing and conservation of seafood products: control and treatment of liquid effluents, sludge, soil and atmospheric emissions. Applicable legislation.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D3	Autonomous work capacity and decision making.
D4	Creativity, initiative and entrepreneurial spirit.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results
That the students know the environmental situation of the transforming sector of fishery products.	A2 A5 B2 B5 C4 D1 D3

That students know the microbial kinetics and the different types of bioreactors	A3 A5 B2 B5 C4 D1 D4
That students know the different physical-chemical methods of industrial wastewater treatment	A2 B2 B5 C4 D4 D5
That students know the different biological methods of industrial wastewater treatment	A2 A3 B2 C4 D3 D4
That students know the techniques and treatments of industrial solid waste.	A2 A5 B1 B5 C4 D1 D3
That the students know the basic concepts of the treatment of contaminated soils and atmospheric contamination	A2 A5 B2 B5 C4 D1 D3
That students are able to handle the regulations on Environmental Management	A3 A5 B1 B5 C4 D1 D3 D5

Contents	
Topic	
1. ENVIRONMENTAL SITUATION OF THE PROCESSING SECTOR OF FISHERY PRODUCTS	1.1 Resource consumption, waste generation. 1.2 Liquid and solid effluents and emissions. 1.3 Generation of odors and noise
2. BIOREACTORS	2.1. Introduction to the biological treatment of wastewater. Microbial metabolism. Microorganisms in water treatment. 2.2. Bacterial growth. Biological growth kinetics. 2.3. Introduction to reactor design. Complete mixing reactor. Plug flow reactor. 2.4. Design of bioreactors for wastewater. Complete mixing biological reactor. Complete mixing reactor with sludge recirculation. plug flow reactor. Operation and control of bioreactors. Treatment efficiency and performance.
3. CHARACTERIZATION AND TREATMENT OF LIQUID EFLUENTS	3.1. Wastewater: origin, classification, estimation of flows, physical, chemical and biological properties, main polluting agents 3.2. Analytical techniques for the characterization of wastewater 3.3. General scheme of a wastewater treatment plant: water treatment and sludge treatment 3.4. Treatment strategies, selection of alternatives

4. PRETREATMENT AND PHYSICO-CHEMICAL TREATMENT OF WASTEWATER	4.1. Pretreatment: dilaceration, homogenization, mixing. 4.2. Physical operations: sedimentation, flotation, filtration in granular media, gas transfer 4.3. Chemical operations: precipitation, coagulation, adsorption. 4.4. Disinfection. 4.5. Elimination of phosphorus and nitrogen by physical-chemical route. 4.6. Elimination of toxic and recalcitrant organic compounds, and dissolved inorganic substances
5. AEROBIC BIOLOGICAL TECHNOLOGIES	5.1. Basics and objectives, types of process 5.2. Aerobic processes with biomass in suspension: activated sludge process, aerated lagoons, sequential batch reactor 5.3. Aerobic processes with fixed biomass: bacterial beds, biodiscs and biocylinders, packed bed reactors 5.4. Biological nitrogen removal: nitrification/denitrification 5.5. Biological removal of phosphorus and joint nitrogen and phosphorus removal
6. ANAEROBIC BIOLOGICAL TECHNOLOGIES	6.1. Biochemistry and microbiology of methanogenesis. Stoichiometry. Energy balance. kinetic aspects. Physical-chemical parameters and nutrients. Design of equipment for anaerobic treatment: hydrodynamics, homogenization, retention time, substrate. 6.2. Anaerobic treatment technology, classification. Systems with unattached biomass. Systems with fixed biomass. multiple systems. 6.3. Lagoon treatment
7. SOLID WASTES: CHARACTERIZATION AND TREATMENT	7.1 Origin, classification and composition of MSW 7.2 Characteristics and physical-chemical properties of solid waste 7.3 Main industrial solid waste. 7.4. Reuse and recycling of fractions of solid waste. 7.5. Storage and transport of solid waste. 7.6. Definition and characteristics of hazardous solid waste
8. ATMOSPHERIC CONTAMINATION	8.1 Chemistry of the troposphere 8.2. Atmospheric pollutants. Reference contaminants. 8.3. Air pollution meteorology. 8.4 Main effects of air pollution. 8.5. Atmospheric dispersion. 8.6 Emission standards of industrial origin 8.7. Treatment of gaseous effluents. Equipment selection. Treatment design. 8.8 Air pollution control
9. TREATMENT OF CONTAMINATED SOILS	9.1. Legal framework 9.2 Technology for soil remediation 9.3 Physical-chemical technology 9.4.Thermal technologies 9.5. Biological treatment.
10. ISO STANDARDS	10.1. ISO 14,000 standards 10.2 Community Eco-management and Eco-audit Regulation: EMAS

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	14	35	49
Laboratory practical	6	12	18
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Laboratory practical	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They take place in special spaces with specialized equipment (chemical laboratories).
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Laboratory practical	The student receives, in a small group, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the activities to be carried out in the chemistry laboratory.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A2 A3	B1 B2	C4	D1 D3
Laboratory practical	The performance and results of the practices and the preparation of the lab report or questionnaire will be evaluated.	20	A3	B2 B5	C4	D3 D4 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A2 A3 A5	B1 B2 B5	C4	D1 D3 D4
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A2 A3 A5	B1 B2 B5	C4	D1 D3 D4

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

American Public Health Association, American Water Works Association, Water Pollution Control Federa, **Métodos normalizados para el análisis de aguas potables y residuales**, Díaz de Santos, Madrid,

Davis, M. L. Y Mastern, S.J., **Ingeniería y ciencias ambientales**, Ed. McGraw Hill,

Hernández Muñoz, A., **Depuración de aguas residuales.**, Colección Senior, Madrid,

Metcalf & Eddy (revisado por G. Tchobanoglous)., **Ingeniería de aguas residuales: tratamiento, vertido y reutilización (3ª ed.)**, McGraw-Hill, Madrid,

Tchobanoglous, G.T.; Theisen, H. y Vigil, S., **Gestión integral de residuos sólidos**, Ed. McGraw-Hill,

Complementary Bibliography

De Lora, F. y Miro, J., **Técnicas de Defensa del Medio Ambiente. Vol I y II**, Ed. Labor, Barcelona,

Degrémont, ed., **Water treatment handbook**, Ed. Degrémont, Paris.,

J. Glynn Henry, Gary W., **Environmental Science and Engineering**, Ed. Prentice Hall Inc,

Spiro, T.G. y Stigliani, W.M, **Química medioambiental**, Ed.. Prentice Hall Inc,

Wark, k. y Warner, C.F., **Contaminación del aire. Origen y control.**, Ed. Limusa,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Business and social aspects				
Subject	Business and social aspects			
Code	V11M085V02108			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Aller Fernandez, Jose Mª Fernández Alonso, Felicidad Franco Alonso, Carlos Longo González, María Asunción López Vidal, María Pilar Ocaña Ortega, Gabriel			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	The aim is for the student to have basic knowledge of aspects related to business strategies, marketing, internationalization, R+D+i projects, technological innovation, etc., all linked to the fishing sector. Concepts of sustainability are also introduced in the exploitation of fishery products and the legislation that pertains to them.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C6	Acquire knowledge about marketing and marketing for fishery and aquaculture products.
C7	Know the operations and basic technologies used in the conservation and transformation of sea products by cold, heat or other physical-chemical methods: refrigeration, freezing, sterilization, pasteurization, semi-preservation.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
That students know the situation of the fishing industry in Spain	A1 A2 B4 C6 D1 D2
Acquire knowledge about business management in industries of the sector, market analysis and diagnosis	A1 A2 B1 B4 C6 D1 D2

Commercialization and marketing for fishery and aquaculture products	A2 A4 B4 C7 D1 D5
Learn about overexploited or endangered species and assess the importance of sustainability in the exploitation of fishery products.	A2 A4 B4 C6 C7 D1 D5
That students know the bases and training for R&D&i projects.	A2 A4 B1 C6 C7 D1 D2
That students develop the skills to carry out practical cases of internationalization.	A2 A4 B1 C6 C7 D2 D5

Contents

Topic	
1. The market: analysis and diagnosis. Commercialization and Marketing. New business management strategies.	(*)
2. Internationalization: factors, strategy design and international agreements.	(*)
3. Bases and training for R+D+i projects. Technological Innovation in the Food Industry. Situation of this industry in Spain.	(*)
4. Practical cases of internationalization.	(*)
5. Exploitation of fishery products: sustainability and identification of overexploited or endangered species. Applicable legislation.	(*)

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	16	40	56
Case studies	4	7	11
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description

Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1	B1	C6 C7	D1 D2
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A1 A2	B1 B4	C6 C7	D1 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A2 A4	B4	C6 C7	D1 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A2 A4	B4	C6 C7	D1 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

Strategor, **Estrategia, estructura, dicisión e identidad**,

Aggett, PJ. et al.,, **PASSCLAIM: Process for the assessment of scientific support for claims on foods**, Eur J Nutr [Suppl 1] 44 : I/1I/2,

Alfranca, O., Rama, R i von Tuzelmann, N, **Innovation spells in the multinational agrifood sector,**, Technovation, vol. 24, 599-614,

Etxezarreta, M. (coord.), **La Agricultura española en la era de la globalización.**, Madrid: Servicio de Publicaciones del Ministerio de Agricultura, Pesca y Alimentación,

Complementary Bibliography

Beckeman, M. i Skjöldebrand, C, **Clusters/ networks promote food innovations**, Journal of Food Engineering, 79, 1418-1425.,

Mili, S., **Transformaciones del consumo alimentario y su repercusión en el sistema agroalimentario**, Revista de Estudios Agrosociales y Pesqueros, nº205, pp.221-247.,

Pelupessy, W. y van Kempen, L., **The Impact of Increased Consumer-orientation in Global Agri-food Chains on Smallholders in Developing Countries**, Competition and Change, Vol. 9 (4) pp: 257-381.,

Avance de Proyecto de la Ley de Seguridad Alimentaria y Nutrición,

Healthy Eating and Drinking-Spain, Consumer Goods Intelligence, publicat per Mintel International Group,

Reglamento (CE) No 1924/2006 relativo a las declaraciones nutricionales y propiedades saludables en los alimentos.,

. Foro CAIXANOVA de Estrategias Empresariales., **Cadena de actividades de la pesca y de los productos derivados del mar**, Instituto de Desarrollo CAIXANOVA,

ANFACO, **Estadísticas de elaboración propia de ANFACO utilizando datos FAO**,

informes elaborados, además del ICEX, ANFACO-CECOPESCA,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA

Cold Storage: Freezing and Refrigeration Procedures and Technologies

Subject	Cold Storage: Freezing and Refrigeration Procedures and Technologies			
Code	V11M085V02205			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Fontán Pérez, Noa Formoso Estévez, María Lorena Gomara Millan, Santiago González Crespán, Ignacio Lado Curty, Arturo Longo González, María Asunción Moreno Conde, Helena María			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	This course studies the effect of refrigeration and freezing on fishery and aquaculture products, as well as the various application technologies for these processes and their influence on the extension of the useful life of said products. For this, the theoretical basis of the cooling processes are analyzed, the alterations that their application produces in the characteristics of the fishery products, and the theoretical and practical aspects of their quality control in the laboratory during their conservation period. The various methods and equipment used and the logistical aspects of the cooling, conservation and storage of these products, both on board and on land, including traceability, as well as the thawing processes and the production lines from the frozen product, are also studied.			

Training and Learning Results

Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C8	Study the different forms of preparation and packaging systems for sea products treated by cold, heat or other methods, both traditionally and new technological orientations: restructured products, prepared dishes, modified atmospheres, high pressures, etc.
C9	Understand the organization of production in the industry of fishery and aquaculture products treated by cold, heat and other processes. Production methods and their logistics.
C10	Determine the criteria and procedures for the control of the quality of the products of the fishing and of the containers and packaging used in its commercial circuit. Know the procedures for its analytical control and defect detection.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results

That the students know the various forms of elaboration in packaging systems for cold-treated sea products: refrigeration and freezing. Understand the nature, properties and types of ice.	A1 A4 B1 B4 C8 C9 D1 D2
That the students know other refrigeration systems (temperature below zero; mixture of water and ice; liquid ice)	A1 A4 B1 B4 C8 D1 D2
That students know the characteristics of frozen seafood products (in the factory and on board)	A1 A3 B1 B4 C8 C9 D1 D2
That the students know the logistics of the product and its traceability	A1 A4 B1 B4 C9 C10 D1 D2 D5
That students know the extension of the shelf life of refrigerated fishery products. Chemical preservatives.	A1 A3 B4 C8 C9 C10 D1 D5
That the students know the lines of elaboration and packaging of products from the frozen and refrigerated product.	A3 A4 B1 C9 C10 D2 D5
That students know the logistics of storage, production and placing on the market and use of by-products	A1 A4 B1 B4 C8 C9 C10 D2 D5

Contents	
Topic	
1. Theoretical foundations of the refrigeration and freezing process	(*)
2. Cooling of fish on board and on land.	(*)
3. Nature, properties and types of ice. Use and necessary quantity in the preservation of fish. Manufacture of ice with seawater and refrigerated seawater.	(*)
4. Other refrigeration systems (temperature below zero; mixture of water and ice; liquid ice).	(*)

5. Auxiliary material, machinery and refrigeration facilities.	(*)
6. Characteristics of frozen sea products (in the factory and on board).	(*)
7. Product logistics. Traceability.	(*)
8. Extension of the shelf life of refrigerated fishery products.	(*)
9. Chemical preservatives.	(*)
10. Methods of freezing and convenience of application.	(*)
11. Thawing and methods	(*)
12. Production lines and products from the frozen and refrigerated product.	(*)
13. Packaging and labeling systems for fresh, refrigerated and frozen products.	(*)
14. Storage logistics, production and placing on the market	(*)
15 Use of by-products: restructured products, prepared dishes.	(*)

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	70	98
Case studies	5	10	15
Studies excursion	3	1	4
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Studies excursion	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They take place in non-academic outdoor spaces. These include field practices, visits to events, research centers, companies, institutions, etc.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.
Studies excursion	Guidance and advice in a small group by the teacher on the concepts of field practices, company visits, etc.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1 A3	B1	C8 C9 C10	D1 D5
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A1 A4	B1 B4	C8 C9 C10	D1 D5

Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A1	B1	C8 C9 C10	D2 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A1	B1	C8 C9 C10	D2 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

- Madrid, A., Gómez Pastrana, J., Santiago, F. y Madrid, J.M., **Refrigeración, congelación y envasado de los alimentos.**, Ed.: AMV y Mundi-Prensa Libros, Madrid,
- María del Carmen Torrens Quesada, Mariano Chirivella Caballero, **Planta de manipulación, envasado y congelado de productos de la pesca.**, Ed.: Universidad Politécnica de Las Palmas, Escuela Universitaria Politécnica,
- Justo Nombela Maqueda, Aurora de Blas Carbonero., **Guía técnica de manipulación a bordo de productos pesqueros. Vol. I: Productos congelados**, Ed.: Ministerio de Agricultura, Pesca y Alimentación, Centro de Publicaciones,
- Justo Nombela Maqueda, **Guía técnica de manipulación a bordo de productos pesqueros. Vol. II: Productos frescos**, Ed.: Ministerio de Agricultura, Pesca y Alimentación, Centro de Publicaciones, Madrid,,
- Zdzislaw E. Sikorski., **Tecnología de los productos del mar: Recursos, composición nutritiva y conservación**, Editorial Acribia S.A., Zaragoza, España,

Complementary Bibliography

- J. Graham, W.A. Johnston y F.J. Nicholson, **El hielo en las pesquerías**, FAO. Documento técnico de pesca nº 331,
- Huss, H.H., **Aseguramiento de la calidad de los productos pesqueros. Laboratorio Tecnológico. Ministerio de Pesca. Dinamarca**, FAO. Documento técnico de pesca nº 334,
- W.A. Johnston, F.J. Nicholson, A. Roger and G.D. Stroud., **Freezing and Refrigerated Storage in Fisheries**, FAO Fisheries Technical Paper 340,
- Huss, H.H. (1998)., **El pescado fresco: su calidad y cambios de su calidad. Laboratorio Tecnológico. Ministerio de Pesca. Dinamarca.**, FAO. Documento técnico de pesca nº 348,
- FAO/WHO, CAC/RCP 52-2003, **Code of Practice for Fish and Fishery Products, in CODEX ALIMENTARIUS.**, FAO Information Division - Food And Agriculture Organization of the United Nations & World H,
- FAO/WHO, CAC/GL 31-1999, **Directrices del Codex para la Evaluación Sensorial del Pescado y los Mariscos en Laboratorio. CODEX ALIMENTARIUS.**, FAO Information Division - Food And Agriculture Organization of the United Nations & World H,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA

Conservation by heat: Canned opening and pasteurized

Subject	Conservation by heat: Canned opening and pasteurized			
Code	V11M085V02206			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Aldao Curra, Manuel Aller Fernandez, Jose Mª Alonso Baptista de Sousa, David Alfonso Goicoechea Lamas, Irene Longo González, María Asunción Ojea Rodríguez, Gonzalo Ruiz Blanco, Carlos S.			
E-mail	mlongo@uvigo.es			
Web	http://http://webs.uvigo.es/pesca_master/			
General description	In this course, the methodologies for applying heat treatments as a means of preserving fishery and aquaculture products are studied, as well as their effect on said products and their influence on the extension of their useful life. For this, the theoretical foundations of these processes are analyzed, mainly pasteurization and sterilization, and the various techniques and equipment used during the processing of fishery products are studied, both theoretically and through practical work on the elaboration of various products in a pilot plant. . Laboratory quality control of the different raw materials used (fish, sauces, packaging...) and the final products obtained are addressed.			

Training and Learning Results

Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B2	That students develop oral and written communication skills in the two co-official languages of autonomy (Spanish and Galician).
B3	That the students develop the skills to perform experimental work, handling of material and biological elements and related programs.
B5	That the students develop the abilities of teamwork, enriched by the pluridisciplinarity.
C8	Study the different forms of preparation and packaging systems for sea products treated by cold, heat or other methods, both traditionally and new technological orientations: restructured products, prepared dishes, modified atmospheres, high pressures, etc.
C9	Understand the organization of production in the industry of fishery and aquaculture products treated by cold, heat and other processes. Production methods and their logistics.
C10	Determine the criteria and procedures for the control of the quality of the products of the fishing and of the containers and packaging used in its commercial circuit. Know the procedures for its analytical control and defect detection.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D3	Autonomous work capacity and decision making.
D4	Creativity, initiative and entrepreneurial spirit.

Expected results from this subject

Expected results from this subject	Training and Learning Results
That the students acquire knowledge about the phases in the elaboration of canned fish and other canned products.	A1 A3 B1 B3 C8 C9 C10 D1 D3
That students know the properties and packaging materials: heat sealing and closure control.	A3 A4 B1 B2 B5 C8 C9 C10 D1 D3
That the students know the equipment, management and control of autoclaves and the sterilization and pasteurization systems of packaged products.	A3 A4 B2 B5 C8 C9 C10 D1 D4
That the students know experimental methods for the determination of sterilization and pasteurization tables.	A1 A4 B1 B2 C8 C9 C10 D3 D4
That students know the efficient management of production, production times and energy savings of the plant.	A1 A3 B1 B3 B5 C8 C9 C10 D3 D4

Contents	
Topic	
1. Phases in the preparation of canned fish and other canned products (prepared dishes).	(*)*
2. Properties and packaging materials.	(*)*
3. Definition and formation of the seam and heat sealing. Control of closings.	(*)*
4. Equipment, management and control of autoclaves and pasteurisers.	(*)
5. Sterilization and pasteurization systems for packaged products.	(*)
6. Experimental methods for the determination of sterilization and pasteurization tables.	(*)
7. Theoretical foundations of the sterilization and pasteurization process.	(*)
8. Production and time management and correct design of the Factory Layout.	(*)

9. Principles of economy of movements. Bimanual diagrams.	(*)
10. Efficient management, energy and input savings.	(*)

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	26	65	91
Laboratory practical	10	16	26
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Laboratory practical	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They are developed in special spaces with specialized equipment (laboratories, pilot plant, etc.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance	
Methodologies	**Description**
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Laboratory practical	Advice, in a small group, by the teacher on the theoretical and practical concepts of the laboratory practices of the subject.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment						
	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1 A3	B1 B2	C8 C9 C10	D1 D4
Laboratory practical	The performance and results of the practices and the completion of the practice report or questionnaire.	20	A3 A4	B2 B3 B5	C8 C9 C10	D3 D4
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A3 A4	B1 B3 B5	C8 C9 C10	D1 D4
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A3 A4	B1 B3 B5	C8 C9 C10	D1 D4

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

 Elaborador de conservas de productos de la pesca, Ideas Propias Editorial, Vigo,

 FAO/WHO, CAC/RCP 23-1979, **Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods, in CODEX ALIMENTARIUS**, FAO Information Division - Food And Agriculture Organization of the United Nations & World H,

 May N.S., **Analysis of Temperature Distribution and Heat Penetration Data for In-Container Sterilisation Processes.**, Campden & Chorleywood Food Research Association, Chippping Campden.,

 Richardson P, **Thermal Technologies in Food Processing.**, Woodhead Publishing Limited and CRC Press LLC, Cambridge, England,

 Brennan, J.G., **Manual del procesado de los alimentos**, Editorial Acribia S.A., Zaragoza, España.,

Complementary Bibliography

Xunta de Galicia, **Estudo de Optimización Enerxética no Sector Conserveiro en Galicia**, Inega (Instituto Enerxético de Galicia),

 Darian Warne, **Manual of Fish Canning**, FAO Fisheries Technical Paper 285,

 May N. And Archer, J., **Heat processing in low acid foods: an approach for selection of Fo requirements.**, Campden & Chorleywood Food Research Association, Chippping Campden,

 Secretaría de Estado de Comercio Dirección General de Comercio Exterior, **Cierres y defectos de envases metálicos para productos alimenticios**, PROAGRAF, S.A,

 Canadian Food Inspection Agency, **Metal Can Defect. Identification and Classification Manual**,

 Cheftel, J.-C., Cheftel, H., **Introducción a la bioquímica y tecnología de los alimentos, Vol. I-II.**, Editorial Acribia S.A., Zaragoza, España,

 Holdsworth, S.D., Simpson, R., **Thermal Processing of Packaged Foods.**, Ed. Springer,

 Shafiur Rahman, M., **Handbook of Food Preservation Second Edition**, CRC Press,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Physical and Chemical Treatments				
Subject	Physical and Chemical Treatments			
Code	V11M085V02301			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Alonso Baptista de Sousa, David Alfonso Barros Velázquez, Jorge García Cabado, Ana González Reboredo, Rodrigo Longo González, María Asunción			
E-mail	mlongo@uvigo.es			
Web	http://webs.uvigo.es/pesca_master/			
General description	In this course, the different physical and chemical procedures used to prolong the useful life of fishery and aquaculture products are addressed, starting with the more traditional methods, to the more innovative ones. It will focus on the use of traditional methods that have been superseded from a technological point of view but which are organoleptically important and offer diversification for the consumer and, at the other extreme, the use of advanced technologies to supply products and lengthen the useful life and considerations necessary to choose the appropriate packaging depending on the type of food, technological process and storage conditions.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C8	Study the different forms of preparation and packaging systems for sea products treated by cold, heat or other methods, both traditionally and new technological orientations: restructured products, prepared dishes, modified atmospheres, high pressures, etc.
C9	Understand the organization of production in the industry of fishery and aquaculture products treated by cold, heat and other processes. Production methods and their logistics.
C10	Determine the criteria and procedures for the control of the quality of the products of the fishing and of the containers and packaging used in its commercial circuit. Know the procedures for its analytical control and defect detection.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

To know the processes involved in the production of semi-preserved products at an industrial level.	A1 A3 B1 B4 C8 C9 D1 D2
That the students know the manufacturing techniques of smoked products and the technological variables.	A1 A5 B4 C9 C10 D1 D5
Acquire knowledge about packaging and its types, for this range of products. Know the process of closing the products.	A3 A5 B1 B4 C8 C9 C10 D1 D2
That the students know the biotechnological methods of conservation of fishery products.	A1 B1 B4 C8 C9 C10 D2 D5
To understand the different aspects and the importance of traditional treatments in this range of products. To understand production methods and logistics	A3 A5 B4 C8 C9 C10 D2 D5

Contents	
Topic	
1. General considerations on manufacturing processes of semi-preserves.	- Process of production of anchovy in salting and fillets of anchovy, codfish in salting, etc.
2. Manufacture of smoked products. Technological variables.	- Production of smoked salmon, herring, etc. - Technological variables of the process and their incidence in the characteristics of the final product. - Controls applicable in industrial processing.
3. Specific packaging processes.	- Packaging in modified atmospheres and controlled atmospheres. - Additives and technological adjuvants, bacteriocins. - Novel procedures: high pressures, electrical pulses, microwave, ohmic heating. - Active and intelligent packaging.
4. Biotechnological methods of conservation of fishery products.	- Bioconservation. Protective cultures. Bacteriocins. Probiotics. - Other methods for natural conservation of fish products: essential oils, spices, other additives. - Production of additives for fishing industries. - Trends in Functional Foods.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	14	35	49
Case studies	4	8	12
Studies excursion	2	4	6
Seminars	2	2	4

Objective questions exam	1	1	2
Self-assessment	1	1	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Studies excursion	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They take place in non-academic outdoor spaces. These include field practices, visits to events, research centers, companies, institutions, etc.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.
Studies excursion	Guidance and advice in a small group by the teacher on the concepts of field practices, company visits, etc.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A1 A3	B1	C8 C9 C10	D1 D2 D5
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A1 A3 A5	B1 B4	C8 C9 C10	D1 D2 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A1 A3	B1 B4	C8 C9 C10	D2 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A1 A3	B1 B4	C8 C9 C10	D2 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

VV. AA., **Elaborador de conservas de productos de la pesca**, Editorial Ideas Propias,

Jean Pierre Nicolle et Camille Knockaert, **Les conserves del produits de la mer**, IFREMER,

Dong Sun Lee, Kit L. Yam y Piergiovanni L, **Food Packaging Science and Technology**, CRC Press,

Philip Richardson, **In-pack processed foods**, Woodhead Publishing Ltd,

Ana G. Cabado y Juan M. Vieites, **Quality Parameters in Canned Seafoods**, Nova Science Publishers, Inc,

Joseph Kerry, **Smart Packaging Technologies**, John Willey & Sons Ltd,

Complementary Bibliography

C. Piñeiro, J. Barros-Velázquez, and S. P. Aubourg, **Effects of newer slurry ice systems on the quality of aquatic food products: a comparative review versus flake-ice chilling methods**, Trends in Food Science and Technology,

C. Campos, O. Rodríguez, P. Calo-Mata, M. Prado and J. Barros-Velázquez, **Preliminary characterization of bacteriocins from Lactococcus lactis, Enterococcus faecium and Enterococcus mundtii strains isolated from turbot (Psetta maxima)**, Food Research International,

P. Calo, S. Arlindo, K. Boehme, T. de Miguel, A. Pascoal and J. Barros-Velázquez, **Current applications and future trends of lactic acid bacteria and their bacteriocins for the biopreservation of aquatic food products**, Food and Bioprocess Technology,

S. Arlindo, P. Calo, C. Franco, M. Prado, A. Cepeda and J. Barros-Velázquez, **Single nucleotide polymorphism analysis of the enterocin P structural gene in Enterococcus faecium strains isolated from nonfermented animal foods**, Molecular Nutrition and Food Research,

S.V. Hosseini, S. Arlindo, K. Böhme, I. Fernández-No, P. Calo-Mata and J. Barros-Velázquez, **Genetic and probiotic profiling of bacteriocin-producing Enterococcus faecium strains isolated from non-fermented animal foods**, Journal of Applied Microbiology,

Minia Sanjuás-Rey, Bibiana García-Soto, Jorge Barros-Velázquez, José R. Fuertes-Gamundi & Sa, **Effect of a two-step natural organic acid treatment on microbial activity and lipid damage during blue whiting (Micromesistius poutassou) chilling.**, International Journal of Food Science & Techno,

Bibiana García-Soto, Minia Sanjuás, Jorge Barros-Velázquez, José R. Fuertes-Gamundi and Santiago P., **Preservative effect of an organic acid-icing system on chilled fish lipids.**, European Journal of Lipid Science and Technology,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Quality of fishery and aquaculture products				
Subject	Quality of fishery and aquaculture products			
Code	V11M085V02303			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Barros Velázquez, Jorge García Cabado, Ana Goicoechea Lamas, Irene Longo González, María Asunción Losada Iglesias, Vanesa Porro Quintela, María Corina			
E-mail	mlongo@uvigo.es			
Web	http://pesca_master.webs.uvigo.es			
General description	In this subject the modifications of the organoleptic characteristics that occur after the capture of the fish and the effects of refrixeration and confection on the loss of freshness of the fishing products, as well as the freshness determination methods that exist. Students will be studied Methods of recognizing food alterations during storage and how to detect the biochemical changes subsequent to the capture and during conservation. The microbiological criteria and procedures to analyze fish quality and related legislation. Even the quick recognition tests will be studied and specific techniques of the alterations of frozen foods and preserved in state frozen.			

Training and Learning Results	
Code	
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B2	That students develop oral and written communication skills in the two co-official languages of autonomy (Spanish and Galician).
B3	That the students develop the skills to perform experimental work, handling of material and biological elements and related programs.
C11	Approach to quality control of each of the production lines of fishery products. Basic knowledge of product quality management.
C12	Acquire basic knowledge and interpret the legislation applicable to the facilities where the handling and treatment of fishery products is carried out along the commercial chain: hygiene, labeling, food safety, plant self-control (APPCC), etc.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D3	Autonomous work capacity and decision making.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Understand the modification of organoleptic characteristics after capture.	A2 B1 B2 C11 C12 D1 D2
Appreciate the effects of refrigeration and freezing on the loss of freshness of the products of fishing.	A3 A4 B1 B2 C11 C12 D1 D2 D5
Know and interpret the methods of determination of freshness.	A2 A3 B2 B3 C11 D1 D5
Know the methods of recognition of food alterations during storage.	A2 A3 B1 B2 C11 C12 D2 D3
Detect biochemical changes subsequent to capture and during conservation.	A2 A3 A4 B2 B3 C11 C12 D2 D3 D5
Know the microbiological criteria and procedures to analyze fish quality and related legislation.	A2 A3 B1 B2 C11 C12 D2 D3 D5
Know the rapid recognition tests and specific techniques of the alterations of frozen foods and preserved in frozen state.	A2 B2 C11 C12 D3 D5
Understand the criteria and procedures for quality control of packaging and for the detection of defects.	A2 B1 B2 C11 C12 D1 D2

Know the quality control of each of the lines of preparation of PPAs.	A3 B2 B3 C11 C12 D1 D3 D5
Manage the regulations related to the technical-legal criteria applicable to the different PPAs.	A3 A4 B3 C11 C12 D1 D2
Acquire the basic knowledge of product quality management.	A2 A3 B1 B2 C11 C12 D2 D3
NewAcquire basic knowledge about inspection of frozen fish. Intrinsic procedures and characteristics.	A2 A4 B2 B3 C11 C12 D3 D5
Know the means, materials and machines necessary for the inspection and distinguish the phases and the main aspects of this process.	A2 A4 B1 B2 C11 C12 D2 D3 D5
Know and interpret the methods of product sampling and evaluation.	A3 A4 B2 B3 C11 C12 D1 D2

Contents	
Topic	
ITEM 1. Basic aspects of quality control of fishery and aquaculture products (PPAs).	-Subsequent organoleptic and biochemical changes capture it. - Effects of refrigeration on loss of freshness. - Modifications of fish constituents during the processing and storage. - Abiotic contaminants.
ITEM 2. Related Microbiological Aspects with the conservation of fish.	-Biotoxins marine. - Legislative advances and alternative methods.
ITEM 3. Physical methods of quality control of fishery products	Rheology of gels for the determination of physical properties: 1) Oscillatory methods (test in tension sweeps and sweep of frequency; 2) Static methods (load-recovery test temperature constant: determination of gel strength, exponent of relaxation and relax time
ITEM 4. Quality control in containers. Defects most common in packaged products.	- Know the methods of recognition of defects. - Know the guidelines for action in the daily practice of the industry.

ITEM 5. Practical Aspects	- Determination of sensory, chemical and microbiological parameters of quality, - Nutritional composition, presence of additives and contaminants.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	26	56	82
Laboratory practical	10	25	35
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Exhibition by the teacher of the contents on the subject matter of study, theoretical bases and / or exercise or projects to be developed by the student.
Laboratory practical	Laboratory practical classes: Determination of sensory, chemical and microbiological parameters of quality, composition nutritional, presence of additives, contaminants
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance	
Methodologies	**Description**
Lecturing	The lecturers will anwer the questions posed by the students about the contents of the course, in face-to-face or online tutorials, or by e-mail.
Laboratory practical	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment						
	Description	Qualification	Training and Learning Results			
Lecturing	The resolution of problems and practical cases, as well as the autonomous work of the student.	20	A2 A3 A4	B1 B2	C11 C12	D1 D2 D3 D5
Laboratory practical	The performance and results of the internships and the completion of the internship report or questionnaire will be evaluated.	20	A2 A3 A4	B1 B2 B3	C11 C12	D1 D2 D3 D5
Objective questions exam	The theoretical knowledge acquired in this course will be evaluated through a test with multiple choice questions.	40	A2 A3 A4	B1 B2	C11 C12	D1 D2 D3 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A2 A3 A4	B1 B2 B3	C11 C12	D1 D2 D3 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

A. O. A. C., **Official Methods of Analysis (l4th edn). Association of Official Analytical Chemis**, Ariington, 1984

FAO/DANIDA,, **El pescado fresco: su calidad y cambios de calidad**, 1988

FARBER J., DODOS K., **Principles of modified-atmosphere and sous vide product packaging.**, A technopnic Publishing Company Inc,, 1995

HEBARD, D. E., Flick G. J. , Martin R. E., **Occurrence and significance of trimethylamine oxide and its derivates in fish and shellfish. Chemistry and biochemistry of marine food products**, Avi Publishing Co. Conneticut, 1992

GOULD,, **New methods of preservation P., Blackie Academic and Professiona**, 1996

Jae W. Park, **Surimi and surimi sea food**, 2nd edition, 2005

Complementary Bibliography

BEATTY S. A.; N. E. GIBBONS,, **The measurement of spoilage of fish**, 1937

CASTELL, C. H.; B. SMITH Y N. NEAL., **Production of dimethylamine in muscle of several species of gadoid fish during frozen storage, especially in relation to presence of dark muscle**, 1971

CASTELL, C. H.; SMITH B. Y DYER, W. J, **Simultaneous measurements of trimethylamine and diniethyiarnine in fish, and their use for estimating quality of frozen storage gadoid fish**, 1974

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA

Food security of fishery and aquaculture products

Subject	Food security of fishery and aquaculture products			
Code	V11M085V02304			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Avendaño Garcia, Jose Mª Calvo Iglesias, Juan Fontán Pérez, Noa Longo González, María Asunción Ruiz Blanco, Carlos S. Viñuela Rodríguez, José Ángel			
E-mail	mlongo@uvigo.es			
Web	http://pesca_master.webs.uvigo.es			
General description	In this course, Self-control in the food chain, production control, logistics and assurance, quality management and quality certification will be addressed.			

Training and Learning Results

Code	
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C13	Assess the importance of the control and certification of the quality of fishery products as a commercial weapon and with a view to traceability and food safety.
C14	Know the food alert management procedures by the competent authority and those responsible for the food chain
C15	Know the critical variables that determine the viability of a product or novel processes. Use tools to obtain critical information for feasibility.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results
Interpret legislation on the self-control of fishery products, legislation on hygiene, labeling and food safety.	A2 A3 C13 C14 D1 D2

Apply in a practical way the analysis of hazards and critical control points (HACCP), with the peculiarities of each type of process.	A3 A5 B1 B4 C14 C15 D1 D5
Assess the importance of the control and certification of the quality of food products from the sea as a commercial weapon and with a view to traceability and food safety.	A3 A5 B1 B4 C13 C14 C15 D2 D5
Know the management procedures of Food Alerts by the competent authority and those responsible for the food chain.	A2 A3 B1 B4 C13 C14 C15 D2 D5
Actions of the Official Control Laboratories of fishery and aquaculture products (PPAs).	A2 A3 B1 B4 C13 C14 C15 D1 D2 D5

Contents	
Topic	
ITEM 1. Self-control in the chain of feeding.	- Traceability. - HACCP. - Study of deviations. - Aspects of practical implementation
ITEM 2. Container-food interactions.	Aspects of Container-food Interactions
ITEM 3. Standards ESO 9000.	- Application to the processes of elaboration of fishing products. - Critical control points.
ITEM 4. Official control of fishery products from third countries.	Official control of fishery products from third countries.
ITEM 5. Official control laboratories of fishing products	Official control laboratories of fishing products
ITEM 6. Official control of fishery products in the EU.	Official control of fishery products in the EU.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	28	66	94
Case studies	5	12	17
Studies excursion	3	3	6
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description

Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the lessons of the subject.
Studies excursion	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They take place in non-academic outdoor spaces. These include field practices, visits to events, research centers, companies, institutions, etc.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance

Methodologies	Description
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by e-mail.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.
Studies excursion	Guidance and advice in a small group by the teacher on the concepts of field practices, company visits, etc.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.

Assessment

	Description	Qualification	Training and Learning Results			
Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A2 A3	B1 B4	C13 C14 C15	D1 D2
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work	20	A2 A3	B1 B4	C13 C14 C15	D1 D2
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A3 A5	B4	C13 C14 C15	D1 D2 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A3 A5	B4	C13 C14 C15	D1 D2 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

FAO, **El Pescado Fresco: su calidad y cambios en su calidad,**,

FAO, **Sistemas de Calidad e Inocuidad de los alimentos. Manual de Capacitación sobre hygiene de los alimentos y sobre el sistema de análsis de Peligros y de Puntos de Control Críticos**,

FAO, **Food safety risk analysis**,

A. Ruiter, **El pescado y los productos derivados de la pesca. Composición, propiedades nutritivas y estabilidad.**, Editorial Acribia,

WHO,, **Training Consideratrions for the Aplication of the Hazard Analysis Critical Control Point System to Food Processing and Manufacturing**,

Gobierno Vasco,, **Estándar de referencia de los sistemas de autocontrol de empresas alimentarias basados en el APPCC/HACCP**,

Complementary Bibliography

Jean-Yves Leveau y Marielle Bouix, **Manual Técnico de Higiene, Limpieza y Desinfección,**,

Ramón Madrid, Juana Mary Madrid, Antonio Madrid, **La limpieza y desinfección en las industrias alimentarias, ILE-Julio-Agosto, 33-38, Roy Kirby., HACCP in practique**,

Roy Kirby.,, **HACCP in practique, Food Control**,

Stumbo, C. R., J.R. Murphy, and J. Cochran, **Nature of Thermal death time curves for P.A. 3679 and Clostridium botulinum**,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Product Innovation and Process				
Subject	Product Innovation and Process			
Code	V11M085V02402			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Mandatory	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Alonso Baptista de Sousa, David Alfonso Longo González, María Asunción Loureiro Perez, Manuel R. Martínez Exposito, Emilio Sartal Rodríguez, Antonio Vázquez Pérez, Xosé Ramón			
E-mail	mlongo@uvigo.es			
Web	http://webs.uvigo.es/pesca_master/			
General description	This course will cover aspects such as the description of the process of launching a new product, approach and development of life studies, methodologies for the development of new products, innovation in process, future prospects in fishery and aquaculture products, methodologies for estimating production costs, map of R&D&I funding.			

Training and Learning Results	
Code	
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
C15	Know the critical variables that determine the viability of a product or novel processes. Use tools to obtain critical information for feasibility.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject	
Expected results from this subject	Training and Learning Results
That students know the management and innovation to develop new processes and new products successfully	A3 A4 B1 B4 C15 D1 D2
That students know the future prospects of fishing and aquaculture products.	A3 A5 B1 B4 C15 D2

That students know innovation in new types of packaging	A3 A5 B1 B4 C15 D2 D5
That students know the necessary aspects for the processing of R&D&i grants.	A3 A4 B1 B4 C15 D2 D5

Contents	
Topic	
1. Processing and conservation of sea products.	- Managing innovation for the succesful development of new products and new processes.
2. Elaboration of new products.	- Methodologies for the development of novel products
3. Creative processes applied to the innovation.	- Future prospects for fishery and aquaculture products.
4. Innovation in packaging.	- General aspects - Use of polymers.
5. R&D&I funding	- Map of funding - The environment of public support for innovation

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	14	35	49
Case studies	4	8	12
Studies excursion	2	4	6
Seminars	2	2	4
Objective questions exam	1	1	2
Self-assessment	1	1	2
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Explanation by the lecturer of the contents of the course, theoretical bases and exercises to be developed by the student. Blackboard and audiovisual means will be used.
Case studies	Resolution of cases, doubts and queries both individually or in a small group regarding the follow-up and study of the course contents.
Studies excursion	Activities of application of knowledge to specific situations and acquisition of basic and procedural skills related to the subject matter of study. They take place in non-academic outdoor spaces. These include field practices, visits to events, research centers, companies, institutions, etc.
Seminars	Personalized and/or group tutorials: student interviews with the course's teaching staff for advice / development of activities of the learning process.

Personalized assistance	
Methodologies	**Description**
Lecturing	The lecturers will answer the questions posed by the students, in face-to-face or online tutorials, or by email.
Seminars	The student receives, in group and/or individually, advice from the teacher on the theoretical and practical concepts of the subject, for the development of the objectives of the course.
Studies excursion	Guidance and advice in a small group by the teacher on the concepts of field practices, company visits, etc.
Case studies	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.

Assessment			
	Description	Qualification	Training and Learning Results

Lecturing	The attendance and participation of the students in the classes, in the discussion of contents and exercises, will be evaluated.	20	A3 A4	B1	C15	D1 D2
Case studies	Problem solving and practical cases will be evaluated, as well as the student's autonomous work.	20	A3 A4 A5	B1 B4	C15	D1 D2 D5
Objective questions exam	There will be an exam with multiple choice questions that will evaluate the theoretical and practical knowledge acquired in the course.	40	A3 A5	B4		D2 D5
Self-assessment	Test-type questionnaires will be carried out through the teaching platform, so that students can evaluate their degree of acquisition of the subject's competences.	20	A3 A5	B4		D1 D5

Other comments on the Evaluation

To pass the course, the student must obtain a grade equal to or greater than 4.5 points out of 10 in the final exam. In case of not reaching this grade, a "Fail" grade will be assigned, with the numerical value of the grade obtained in the final exam.

Sources of information

Basic Bibliography

Benavides C.A, **Tecnología, innovación y empresa**, Ed. Ediciones Pirámide.,

Henry Chessbrough, **Open Services Innovation: Rethinking Your Business to Grow and Compete in a New Era**,

Dorothy Leonard, **Capacidades empresariales para la innovación. Su gestión**, Ed. Cotec.,

P.J. Fellows., **Food Processing Technology**, Cambridge, England. Woodhead Publising Limited y CRC Press LLC,

Plan Galego de Investigación, Innovación e Crecemento,

Complementary Bibliography

Corcoran, Elizabeth, **Redesigning Research**, Scientific American,

Henry Chessbrough, **Open Business Models: How to Thrive in the New Innovation Landscape**,

Badaway. M.K, **Temas de gestión de la innovación para científicos e ingenieros**, Fundación COTEC,

Alan West, **Estrategia de Innovación**,

Aberdeen, **The Product Innovation Agenda Benchmark Report**,

Robert G. Cooper, **The seven principles of the latest Stage-Gate® method add up to a streamlined,**,

Plan Nacional de I+D+i, **Programa de Trabajo 2011.**,

PTEPA, **Mapa de ayudas en el sector pesquero y acuicola**,

PTEPA, **Competencias en I+D+i pesquera y acuicola.**,

A. G. Gaonkar., **Food Processing: Recent developments**, Elsevier Science & Technology Books,

T. Ohlsson y N. Bengtsson., **Minimal processing technologies in the food industry**, Cambridge, England. Woodhead Publishing Limited,

G.V. Barbosa-Cánovas, M.M. Góngora Nieto, U.R. Pothakamury and B.G. Swanson., **Preservation of foods with pulsed electric fields**, San Diego, USA. Academic Press.,

M. Shafiur Rahman., **Handbook of food preservation**, Boca Raton, USA. CRC Press LLC.,

Da-Wen Sun., **Emerging technologies for food processing**, Food science and Technology, International Series. Elsevier Academic Press,

www.micinn.es,

www.cdti.es,

www.cordis.europe.eu,

www.cotec.es,

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Internships				
Subject	Internships			
Code	V11M085V02405			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	2nd	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Longo González, María Asunción			
E-mail	mlongo@uvigo.es			
Web	http://pesca_master.webs.uvigo.es			
General description	Carry out an internship in a company in the seafood conservation sector, in order to address specific practical tasks that, based on the knowledge acquired, allow them to better understand the productive environment of the Sector in a global context. The student will participate in the activities that are scheduled by the tutor, the Master's coordinator and the company's staff. These activities will be framed within the existing processes in the company itself related to the conservation of fishing products.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B2	That students develop oral and written communication skills in the two co-official languages of autonomy (Spanish and Galician).
B3	That the students develop the skills to perform experimental work, handling of material and biological elements and related programs.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
B5	That the students develop the abilities of teamwork, enriched by the pluridisciplinarity.
B6	That the students develop the ability of elaboration, presentation and defense of works or reports.
C1	Know and differentiate the main fishing and aquaculture species of commercial interest in our country, with its main biological characteristics.
C2	Know the parameters of safety and characterization of the quality of fishery products, as well as their possible toxicological risks, and the legislation applicable to such products.
C3	Acquire basic knowledge about laboratory analytical control of fishery products, including the biotic and abiotic contaminants potentially present in them.
C4	Know the main environmental aspects that affect the processing and conservation of seafood products: control and treatment of liquid effluents, sludge, soil and atmospheric emissions. Applicable legislation.
C5	Acquire the knowledge of business management in industries of the sector.
C6	Acquire knowledge about marketing and marketing for fishery and aquaculture products.
C7	Know the operations and basic technologies used in the conservation and transformation of sea products by cold, heat or other physical-chemical methods: refrigeration, freezing, sterilization, pasteurization, semi-preservation.
C8	Study the different forms of preparation and packaging systems for sea products treated by cold, heat or other methods, both traditionally and new technological orientations: restructured products, prepared dishes, modified atmospheres, high pressures, etc.
C9	Understand the organization of production in the industry of fishery and aquaculture products treated by cold, heat and other processes. Production methods and their logistics.

C10	Determine the criteria and procedures for the control of the quality of the products of the fishing and of the containers and packaging used in its commercial circuit. Know the procedures for its analytical control and defect detection.
C11	Approach to quality control of each of the production lines of fishery products. Basic knowledge of product quality management.
C12	Acquire basic knowledge and interpret the legislation applicable to the facilities where the handling and treatment of fishery products is carried out along the commercial chain: hygiene, labeling, food safety, plant self-control (APPCC), etc.
C13	Assess the importance of the control and certification of the quality of fishery products as a commercial weapon and with a view to traceability and food safety.
C14	Know the food alert management procedures by the competent authority and those responsible for the food chain
C15	Know the critical variables that determine the viability of a product or novel processes. Use tools to obtain critical information for feasibility.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D3	Autonomous work capacity and decision making.
D4	Creativity, initiative and entrepreneurial spirit.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results
Address specific practical tasks that, based on the knowledge acquired, allow a better understanding of the productive environment of the sector in a global context.	A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 D1 D2 D3 D4 D5

Contents

Topic	
External internships in an industry in the canning sector and / or in a research center.	Address specific practical tasks that, based on the knowledge acquired, allow a better understanding of the productive environment of the sector in a global context.

Planning

	Class hours	Hours outside the classroom	Total hours
Practicum, External practices and clinical practices	220	0	220
Seminars	3	0	3
Report of practices, practicum and external practices	2	0	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Practicum, External practices and clinical practices	The students will be integrated into an industry in the seafood preservation sector. The students will learn and have an overview of all the modules of the production process of the industry where they carry out the internship. The students will be assigned a task, within the various modules that the production process involves. The activity of the companies with which the collaboration agreements have been reached allows students to acquire competencies in the procedures related to the various processes of conservation, safety, quality and technology, environmental management, marketing and innovation and sustainability.
Seminars	The activity carried out within the industry will be followed by the tutors of the master's degree and by a person in charge of the company appointed to supervise and guide the students in the tasks assigned.

Personalized assistance	
Methodologies	**Description**
Practicum, External practices and clinical practices	Advise students on issues and difficulties that arise during their external internships.
Seminars	An academic responsible person and another from the company will be assigned, to supervise and advise the student's work, and a contact will be maintained with the persons in charge of the Master.

Assessment						
	Description	Qualification	Training and Learning Results			
Practicum, External practices and clinical practices	The activity carried out will be supervised and evaluated by the tutors designated for this purpose (academic and company tutor). The grade for the course will be obtained from the report issued by the tutor in the company on the activity carried out (70% of the total grade) and the internship report that each student must submit at the end of the internship (30% of the total grade).	100	A1 A2 A3 A4 A5	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15	D1 D2 D3 D4 D5

Other comments on the Evaluation

Sources of information

Basic Bibliography

Complementary Bibliography

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide will prevail.

IDENTIFYING DATA				
Final Dissertation				
Subject	Final Dissertation			
Code	V11M085V02406			
Study programme	Máster Universitario en Ciencia y Tecnología de Conservación de Productos de la Pesca			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	10	Mandatory	2nd	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Longo González, María Asunción			
Lecturers	Longo González, María Asunción			
E-mail	mlongo@uvigo.es			
Web	http://pesca_master.webs.uvigo.es			
General description	Development by the students of a work of theoretical and/or experimental content related to the industry of conservation of fishing products. The work will be of an individual nature, supervised by professors of the master's degree and aimed at evaluating the competences associated with it.			

Training and Learning Results	
Code	
A1	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
A2	That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
A4	That students know how to communicate their conclusions, and the knowledge and ultimate reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way.
A5	That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B1	That the students acquire the comprehension, analysis and synthesis capacities.
B2	That students develop oral and written communication skills in the two co-official languages of autonomy (Spanish and Galician).
B3	That the students develop the skills to perform experimental work, handling of material and biological elements and related programs.
B4	That the students develop the problem-solving abilities of application of the theoretical knowledge in practice.
B5	That the students develop the abilities of teamwork, enriched by the pluridisciplinarity.
B6	That the students develop the ability of elaboration, presentation and defense of works or reports.
C1	Know and differentiate the main fishing and aquaculture species of commercial interest in our country, with its main biological characteristics.
C2	Know the parameters of safety and characterization of the quality of fishery products, as well as their possible toxicological risks, and the legislation applicable to such products.
C3	Acquire basic knowledge about laboratory analytical control of fishery products, including the biotic and abiotic contaminants potentially present in them.
C4	Know the main environmental aspects that affect the processing and conservation of seafood products: control and treatment of liquid effluents, sludge, soil and atmospheric emissions. Applicable legislation.
C5	Acquire the knowledge of business management in industries of the sector.
C6	Acquire knowledge about marketing and marketing for fishery and aquaculture products.
C7	Know the operations and basic technologies used in the conservation and transformation of sea products by cold, heat or other physical-chemical methods: refrigeration, freezing, sterilization, pasteurization, semi-preservation.
C8	Study the different forms of preparation and packaging systems for sea products treated by cold, heat or other methods, both traditionally and new technological orientations: restructured products, prepared dishes, modified atmospheres, high pressures, etc.
C9	Understand the organization of production in the industry of fishery and aquaculture products treated by cold, heat and other processes. Production methods and their logistics.
C10	Determine the criteria and procedures for the control of the quality of the products of the fishing and of the containers and packaging used in its commercial circuit. Know the procedures for its analytical control and defect detection.
C11	Approach to quality control of each of the production lines of fishery products. Basic knowledge of product quality management.

C12	Acquire basic knowledge and interpret the legislation applicable to the facilities where the handling and treatment of fishery products is carried out along the commercial chain: hygiene, labeling, food safety, plant self-control (APPCC), etc.
C13	Assess the importance of the control and certification of the quality of fishery products as a commercial weapon and with a view to traceability and food safety.
C14	Know the food alert management procedures by the competent authority and those responsible for the food chain
C15	Know the critical variables that determine the viability of a product or novel processes. Use tools to obtain critical information for feasibility.
D1	Ability to understand the meaning and application of the gender perspective in the different fields of knowledge and professional practice with the aim of achieving a more just and egalitarian society.
D2	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.
D3	Autonomous work capacity and decision making.
D4	Creativity, initiative and entrepreneurial spirit.
D5	Commitment to ethics in the profession and in society.

Expected results from this subject

Expected results from this subject	Training and Learning Results
Search for detailed information on the selected topic. Consultations and selection of bibliographical sources.	A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 D1 D2 D3 D4 D5

Work development. Laboratory work, theory, pilot plant or information in industries of the sector.	A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 D1 D2 D3 D4 D5
Oral and written presentation of a final report of the work done	A1 A2 A3 A4 A5 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 D1 D2 D3 D4 D5

Contents
Topic

Elaboration of a Master's Dissertation	- Selection of the topic to be studied. - Search and selection of bibliographical sources - Laboratory work, pilot plant or information in industries of the sector. - Advice with the coordinators of the module or the personnel from industry. - Preparation of reports. - Presentation and defense of the work.

Planning

	Class hours	Hours outside the classroom	Total hours
Project based learning	0	200	200
Presentation	2	8	10
Project	2	38	40

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Project based learning	Elaboration of a written document where it is reflected: content of the document, depth of the topic, adequate planning and sequencing, management of bibliographic sources, as well as presentation of results, conclusions and personalized opinions. Ideas of advance and future perspectives of the subject.

Personalized assistance

Methodologies	Description
Project based learning	The student will be guided in the acquisition of basic skills and problem solving related to the subject matter of study. The progress of the student will be monitored.
Tests	**Description**
Project	Guide the student in the writing of the work. elaboration of objectives, results and conclusions.

Assessment

	Description	Qualification	Training and Learning Results			
Presentation	Presentation by the students before an academic jury of the work carried out, individually or in groups.	30	A1 A2 A3 A4 A5	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15	D1 D2 D3 D4 D5
Project	For the evaluation of the work, the content of the written document will be taken into account. Depth of the topic, adequate planning and sequencing, management of adequate bibliographical sources, as well as presentation of results, conclusions and personalized opinions will be assessed. The quality of the project will be evaluated taking into account the evaluation of the jury (50% total qualification) and that of the tutor/s (20% total qualification).	70	A1 A2 A3 A4 A5	B1 B2 B3 B4 B5 B6	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15	D1 D2 D3 D4 D5

Other comments on the Evaluation

Sources of information

Basic Bibliography

Complementary Bibliography

Recommendations

Other comments

In caso of discrepancies, the Spanish version of this guide will prevail.