General information		
Academic subject	Packaging Technologies	
Degree course	Safety and Health of Food of Animal Origin	
Academic Year	2021-2022	
European Credit Transfer and Accumulation System (ECTS)		5
Language	Italian	
Academic calendar (starting and ending date)	1st semester	
Attendance	Not mandatory	

Professor/ Lecturer	
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Department and address	Veterinary Medicine Campus – Valenzano (BA)
Virtual headquarters	Teams classroom
Tutoring (time and day)	Every day after appointment by email

Syllabus	
Learning Objectives	The course aims to transfer to students the principles and applications of classical and innovative technologies used for the packaging of food products. Particular attention will be paid to the study of the shelf-life of fresh products.
Course prerequisites	
Contents	General characters and terminology; Terminology; Purpose and characteristics of the packaging; Properties and testing of materials for food packaging: Chemical properties of packaging materials; Chemical structure and characteristics; Atomic constituents; Bonds between atoms; Molecular bonds; Molecular organization; Chemical properties of interest for packaging materials; Resistance to oils and fats; Stress cracking resistance; Biodegradability, biodeterioration, biotoxicity, biofilm formation. Physical properties of packaging materials (I): surface properties, thermal, mechanical and electromagnetic; Surface tension, wettability and adhesiveness; Methods of measurement of surface properties; Relationship between contact angle and surface energy; Surface energy modification; Thermal conductivity; Thermal capacity and heat; Coefficients of expansion; Useful temperature range (range of use); Calorific value and energy content; Transition temperatures. Mechanical properties: Resistance to sliding (friction); Mechanical resistance. Properties related to dynamic stresses; Cushioning properties. Electromagnetic properties; between electromagnetic radiation and matter; Electromagnetic properties of packaging materials in the ultraviolet and visible regions; Behavior of a material subjected to radiation Ionizing; Behavior of an irradiated material with microwave. Density and properties: Density; Weight Physical properties of packaging materials (II): diffusional properties; Permeation of gases and vapors; Mechanisms of migration; Migration forecasting models.
Books and bibliography	Piergiovanni, L., & Limbo, S. (2010). Food packaging: materiali, tecnologie e soluzioni. Springer Science & Business Media.

Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
125	40	25	60
ECTS			
5	4	1	

Teaching strategy	
	The lessons will be presented through PC-assisted tools (PowerPoint, video). Handouts and educational material will be provided through online platforms (eg: Edmodo, Google Drive ...)
Expected learning outcomes	
Knowledge and understanding on:	○ Knowing how to describe the different packaging and filling technologies and the influence on the quality of food and beverages. ○ Knowing how to Describe the aspects related to the decrease in quality during the preservation of food and beverages. ○ Knowing how to define the tests for the evaluation of the shelf-life of food and beverages.
Applying knowledge and understanding on:	○ Knowing how to describe the applications of packaging and filling technologies. ○ Knowing how to Apply the different tests for the evaluation of the shelf life and the ability to understand the results.
Soft skills	• Autonomy of judgments o Make reasonable assumptions about the modulation of technological parameters in packaging and filling technologies o Make reasonable assumptions to choose the test that can simulate and predict the shelf life of food and beverages. • Communication skills o Describe packaging and filling technologies using the technical lexicon. • Ability to learn independently o Learn to independently acquire updated information.

Assessment and feedback	
Methods of assessment	The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory / production plants, as reported in the Academic Regulations for the Bachelor Degree (article 9) and in the study plan (Annex A). Students attending at the lectures may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for a year. The evaluation of the preparation of the student occurs on the basis of established criteria, as detailed in Annex B of the Academic Regulations for the Bachelor's degree in Food Safety of Animal Origin and Health.
Evaluation criteria	• Knowledge and understanding: Demonstration of having understood all the arguments • Applied knowledge and understanding: ability to develop problem analysis and structure of arguments

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	Autonomy of judgment: critical reasoning skills on the study carried out • Autonomy of judgment: critical reasoning skills on the study carried out • Communication skills: ability to discursively organize knowledge; quality of exposure, competence in the use of specialized vocabulary, effectiveness, linearity. • Ability to learn: Demonstration of having acquired all the arguments
Criteria for assessment and attribution of the final mark	30- 30 cum laude: Excellent preparation, high level of knowledge, absolute mastery of the subject and language. Demonstration of having acquired all the arguments at a high level. Excellence in the development of problem analysis, in the structuring of arguments and autonomy of judgment. 28-29: Accurate preparation, excellent level of knowledge, excellent command of the subject and language. Demonstration of having acquired all the arguments at a good level. Good ability to analyze problems, structure of arguments and autonomy of judgment. 25-27: Adequate preparation, good level of knowledge, good command of the subject and language. Demonstration of having acquired all the arguments at a good level. Good ability to analyze problems, structure of arguments and autonomy of judgment. 21-24: Satisfactory preparation, fair level of knowledge, fair command of the subject and language. Fair ability to learn and applied understanding. Fair ability to analyze problems, structure of arguments and autonomy of judgment. 18-21: Preparation from just sufficient to sufficient, level of knowledge adequate to the minimum level of requests, sufficient mastery of the subject and of the language. Acceptable ability to learn, applied understanding, problem analysis, structure of arguments and autonomy of judgment. <18 Insufficient preparation, level of knowledge not adequate for the minimum level of requests, insufficient mastery of the subject and of the language. Poor ability to learn, applied understanding of problem analysis, structuring of arguments and little autonomy of judgment.
Additional information	

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