

General information	
Academic subject	<i>Instrumental analyses for food quality (I.C. Foods and applied nutrition)</i>
Degree course	<i>Food Science and Technology (LM70)</i>
Academic Year	<i>second</i>
European Credit Transfer and Accumulation System (ECTS)	3 ECTS
Language	<i>Italian</i>
Academic calendar (starting and ending date)	<i>September 26th, 2022 – January 20th, 2023</i>
Attendance	<i>Not mandatory</i>

Professor/ Lecturer	
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Virtual headquarters	<i>Microsoft Teams</i>
Tutoring (time and day)	Monday-Friday 9.00-16.00

Syllabus	
Learning Objectives	The course aims to provide knowledge on non-destructive spectroscopic techniques for monitoring the quality and authenticity of food, as well as on instrumental analytical techniques for the evaluation of the structural and sensory characteristics of food. The knowledge will be completed by a presentation of the main multivariate analysis tools useful for the processing of complex data.
Course prerequisites	Knowledge related to the composition of food, quality assessment indices; notions of analytical chemistry and statistics.
Contents	Non-destructive spectroscopic and optical analysis methods: principles, theoretical background and instrumentation: - NIR - IR - Imaging - Color Elements of chemometrics for the exploration and processing of multivariate data. Analysis of structure and rheology. <i>Texture evaluation methods; instrumentation; compression, penetration, cutting, compression-extrusion, bending, tension, adhesion tests; food applications.</i> <i>Introduction to the rheology of food products; instrumentation; food applications.</i> Instrumental-sensory analysis. <i>Principles of CG-olfactometry, nose and electronic tongue.</i>
Books and bibliography	Cabras P., Tuberoso C.I.G. <i>Analisi dei Prodotti Alimentari</i> . Piccin edizioni 2010. Skoog, Holler, Crouch. <i>Chimica analitica strumentale</i> . Edises 2009. Stewart, G. F., Schweigert, B. S., Hawthorn, J., & Bourne, M. (2012). <i>Food texture and viscosity: Concept and measurement</i> . Academic Press. Brereton, R. G. (2007). <i>Applied chemometrics for scientists</i> . John Wiley & Sons.
Additional materials	Notes, slides and other bibliographic materials will be furnished during the course.

Work schedule	

Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/Self-study hours
Hours			
75	16	14	45
ECTS			
3	2	1	
Teaching strategy	The topics of the course will be treated with the help of presentations, videos, case studies and other teaching materials useful to complete the learning. The exercise activities will allow to deepen part of the instrumental methods studied during the course and to practice directly in data processing.		
Expected learning outcomes	The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification).		
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge of destructive and non-destructive analytical methods, target, and non-target and, for the evaluation of food quality and ability to interpret analytical results. 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to apply analytical methods and related methods of data treatment for the determination of food quality. ○ Capacity of interpretation of multivariate analysis reports. 		
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Critical spirit in the evaluation and choice of analytical means suitable to monitor the characteristics and quality of specific foods as well as to evaluate the goodness and reliability of the data. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to describe the target and non-target analytical methods and for the quality of food products with the relative advantages and disadvantages. ○ Ability to argue about the characteristics of different analytical methods in relation to specific situations. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to deepen and update their knowledge related to analytical methods useful for assessing the quality of food products. 		
The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification).			

Assessment and feedback	
Methods of assessment	<p>The exam consists of an oral test related to the topics developed during the hours of theoretical and theoretical-practical lessons in the classroom and in the laboratory, as reported in the Didactic Regulations of the Degree Course in Food Science and Technology (art. 9) and in the study plan (Annex A).</p> <p>For students enrolled in the year of course in which the teaching is carried out, there is an exemption test, which consists of a written test on topics developed by the date of the exemption or in any case agreed with the teacher. The test will be evaluated in thirtieths and in case of a positive outcome, in the final oral exam the interview will focus on the remaining part of the teaching contents. The result of the exemption test contributes to the evaluation of the exam and is valid for one academic year.</p>

	The exam of foreign students can be carried out in English according to the methods described above.
Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ Level of knowledge of the analytical methods studied for the evaluation of food quality. Know the basics of multivariate data analysis. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ Demonstrate the ability to apply analytical methods for assessing the composition and quality of processed foods. ○ Demonstrate that you can draw conclusions about the quality of a food from the results of multivariate analysis. • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ Express reasonable assumptions about the choice of the most suitable methods for a correct analysis of foods as well as methods for processing the analytical data in accordance with the specific problem. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Appropriate use of the technical-scientific lexicon and ability to argue analytical choices in a critical way. • <i>Communication skills</i> <ul style="list-style-type: none"> ○ The student will be evaluated considering the use of appropriate technical language. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Knowledge of the channels and methodologies to deepen and update independently their knowledge related to analytical methods for the evaluation of food quality and the processing of multivariate data.
Criteria for assessment and attribution of the final mark	The evaluation of the student's preparation takes place based on pre-established criteria, while the vote also in accordance with what is reported in Annex B of the Didactic Regulations of the Degree Course.
Additional information	