General Information	
Academic subject	Analytical and instrumental chemistry with laboratory
Degree course	Bachelor programme: Food Science and Technology
ECTS credits	6 ECTS
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Elisabetta Loffredo	elisabetta.loffredo@uniba.it	AGR/13

ECTS credits details		
Basic teaching activities	4 ECTS Lectures	2 ECTS Laboratory classes

Class schedule	
Period	I semester
Course year	Second
Type of class	Lecture- workshops-laboratory-didactic visits

Time management	
Hours	150
In-class study hours	60
Out-of-class study hours	90

Academic calendar	
Class begins	September 28th, 2020
Class ends	January 22nd, 2021

Syllabus	
Prerequisites/requirements	Prerequisites: "Chemistry" Knowledge of general, inorganic and organic chemistry
Expected learning outcomes	*Knowledge and understanding* o Knowledge and understanding for the choice and use of the most appropriate techniques to solve specific problems concerning food processes *Applying knowledge and understanding* o Ability to select and use appropriate analytical techniques to evaluate food quality o Ability to perform correctly the general or specific sequence of phases of a chemical analysis o Ability to follow safety rules in the chemistry laboratory *Making informed judgements and choices* o Ability to select appropriate procedures to evaluate important properties of food or other matrices influencing food quality o Ability to improve and implement analytical procedures that are appropriate to determine important chemical characteristics of matrices connected to food quality and safety *Communicating knowledge and understanding* o Ability to describe the most important methods and instrumentation used for quantitative and qualitative chemical analyses concerning foods or other matrices connected with foods *Capacities to continue learning*

	o Ability to deepen and update the knowledge of chemical methods and conventional or more advanced analytical techniques useful to assess the quality and safety of food The expected learning outcomes, in terms of knowledge and skills, are listed in Annex A of the Degree Course Regulation (expressed through the European Descriptors of Degree qualification)
Contents	General aspects. Qualitative and quantitative analyses. Classification of the quantitative methods of analysis. Steps in a typical laboratory analysis. Innovative techniques of extraction (solid phase extraction, SPE). Random and systematic errors in chemical analyses. The statistical treatment of analytical data. The measurement and expression of data accuracy. Basic equipment in the laboratory. Safety in the laboratory. Gravimetric and volumetric methods of analysis. Applications of titrimetric methods of analysis, including acid/base, precipitation, complex-formation and red/ox titrations. Electroanalytical methods. Electrodes and pH meter. Potentiometry. Introduction to spectroscopy. Properties of the electromagnetic radiation and wave parameters. The electromagnetic spectrum. Atomic and molecular absorption of radiation. Emission of electromagnetic radiation. Radiative and non-radiative relaxing processes (fluorescence and phosphorescence). Instrument components for photometric and spectrophotometric analysis. Sources of electromagnetic radiation and wavelength selectors. Detectors. Molecular spectroscopy. Fundamentals of ultraviolet and visible molecular absorption spectroscopy (UV/Vis). Fundamentals of infrared molecular absorption spectroscopy (IR e FT IR). Fundamentals of molecular fluorescence spectroscopy. Atomic spectroscopy. Methods based upon flame atomization and electrothermal atomizers. Atomic emission methods based on plasma sources. Atomic absorption and atomic emission spectroscopy. Introduction to chromatographic methods. General description of chromatography. Planar and column chromatography. Applications of chromatography. High performance liquid chromatography (HPLC) and Gas chromatography (GC). Instruments for HPLC and GC. Choice and optimization of the chromatographic method. Detectors for HPLC e GC. Notes of Mass spectrometry. Description a typical mass spectrum.
Course program	
Reference books	• Fondamenti di Chimica Analitica di Skoog & West III edizione. EdiSES. • D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch. Fundamentals of Analytical Chemistry. Brooks/Cole Eds. • Notes of the lectures distributed during the course. • Files downloadable from Edmodo platform. Additional readings: • D.C. Harris. Quantitative Chemical Analysis. W.H. Freeman and Co. Eds. • D.C. Harris. Analisi Chimica Quantitativa. Zanichelli.
Notes	
Teaching methods	Lectures will be presented through PC assisted tools (PowerPoint, Adobe Acrobat, etc.). Photos and movies will be also showed during the course with the aim of presenting relevant case studies

	Educational supplies will be provided by means of a mailing list or online platforms (i.e.: Edmodo, Google Drive…)
Evaluation methods	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 in Food Science and Technology (article 9) and in the study plan (Annex A).
	Students attending at the lectures may have a middle-term preliminary exam, consisting of an oral 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 Degree in Food Science and Technology.
	Non-Italian students may be examined in English language, according to the aforesaid procedures.

Evaluation criteria	*Knowledge and understanding*
	   o Ability to describe the criteria of choice and the use of the most appropriate techniques, taught at lectures, to be used for chemical analysis concerning food processes
	Applying knowledge and understanding
	   o Ability to select and use appropriate analytical techniques to evaluate food quality
	   o Ability to perform correctly the general or specific sequence of phases of a chemical analysis and to follow safety rules in the chemistry laboratory
	Making informed judgements and choices
	   o Ability to elaborate and select appropriate procedures to evaluate important properties of food or other matrices influencing food quality, presented as a case study
	Communicating knowledge and understanding
	   o Ability to describe the most important methods and instrumentation used for chemical analyses concerning foods or other matrices connected with foods, presented as a case study
	Capacities to continue learning
	   o Ability to develop new approaches for choosing and applying appropriate methods to determine important constituents in matrices of interest in the food sector, presented as a case study

Receiving times	Tuesday and Friday, 9.00-11.00 by appointment.