General Information	
Academic subject	Environmental chemistry
Degree course	Master programme: Food Science and Technology
ECTS credits	6 ECTS
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Ignazio Allegretta	ignazio.allegretta@uniba.it	AGR/13

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

Class schedule	
Period	II semester
Course year	First
Type of class	Lectures, workshops, field classes

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

Academic calendar	
Class begins	March 1st, 2021
Class ends	June 11th, 2021

Syllabus	
Prerequisites/requirements	Principles of general, inorganic and organic chemistry.
Expected learning outcomes	*Knowledge and understanding* ○ Knowledge of the main environmental pollution sources in agricultural systems ○ Knowledge of the uses of wastes and byproducts from agri-food systems ○ Knowledge of the mechanisms of adsorption and accumulation of pollutants in vegetables and foods *Applying knowledge and understanding* ○ Understanding phenomena of transfer and accumulation of contaminants in agri-food systems *Making informed judgements and choices* ○ Application to food processing of the acquired knowledge on prevention and control on pollution and contamination *Communicating knowledge and understanding* ○ Ability to describe environmental issues regarding food processing and to relate them to other disciplines *Capacities to continue learning* ○ Skill of updating the knowledge of pollution and food contamination 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)
Contents	INTRODUCTION. Concept and definitions of environmental chemistry. SOIL. POLLUTION. Indicators and indexes of environmental quality, organization models. ENVIRONMENTAL CHEMISTRY. Molecules, elements and their impact on human

	toxicity. Biogeochemical cycles (C, N, P, S e water). Exogenous and endogenous cycles. Water, atmosphere, lithosphere and soil. ATMOSPHERIC CHEMISTRY AND POLLUTION. Physical characteristics and energy and mass transfer. Thermal inversion. Chemical and photochemical reactions. DPSIR Model applied to VIA Atmosphere component. Atmospheric pollutants, particles and effects to human health Inorganic pollutants. Carbon monoxide. Sulphur dioxide. Nitrogen oxides. Carbon dioxide and green house effect. Acid rains. SOIL CHEMISTRY AND POLLUTION. Soil components, physical and chemical properties and organic/ inorganic xenobiotics. Ionic retention, kinetics and exchange and sorption isotherms. Soil micro- and macro-elements. DPSIR Model applied to VIA Soil component. Heavy metals and organic xenobiotics. Soil degradation, erosion, salinization, sodicization and desertification. Wastes and pollutants in soil. Pesticides and xenobiotics. WATER CHEMISTRY AND POLLUTION. Phases interactions. DPSIR Model applied to VIA Hydrosphere component. Heavy metals and other inorganic species. Organic pollutants. Pesticides in waters. PCBs. Wastewater and drinking water processes. WASTES AND THEIR RECYCLING: Introduction to wastes. Waste materials: paper, plastics, glass and organic wastes. Biomass recycling and agricultural valorization (focus on wastes from the agricultural and food production field). Food contamination. Organic (pesticides, PCB, IPA) and inorganic (heavy metals) toxic residues. Release phenomena by material contacts.
Course program	
Reference books	• Lecture notes and educational supplies provided during the course. • Colin Baird, Michael Cann. Chimica Ambientale. 3° Ed., Zanichelli, 2013. • P. Sequi (Coord.), Fondamenti di Chimica del Suolo, Patròn Editore, Bologna 2005. • G. Cerutti. Residui, additivi e contaminanti degli alimenti. Tecniche Nuove, Milano, 1999. • Oss. Naz. Pedologico e Qualità del Suolo, M.I.R.A.A.F., Metodi Ufficiali di Analisi Chimica del suolo, Roma, 1994. • APAT, IRSA-CNR. Metodi analitici per le acque. Manuali e linee guida (29/2003).
Notes	
Teaching methods	Lectures will be presented through PC assisted tools (PowerPoint, video). Field and laboratory classes, reading of regulations will be experienced. Lecture notes and educational supplies will be provided by means of teacher's webpage
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 Master 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 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 Master 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* ○ Describing the main sources of environmental and agri-food systems pollution ○ Describing methods of reuse of biomasses ○ Describing the main food contaminants *Applying knowledge and understanding* ○ Describing the aspects of environmental and food pollution and contamination *Making informed judgements and choices* ○ Expressing reasonable hypotheses about prevention and control of pollution/contamination in food chains *Communicating knowledge and understanding* ○ Describing environmental issues related to food processes and technologies *Capacities to continue learning* ○ Describing a possible approach to evaluate a pollution/contamination issue in food processes
Receiving times	Monday-Friday in the afternoon by previous appointment