Syllabus

Course Description

Course Title	Chemometric approaches to study the chemical and sensory markers of food processing
Course Code	46027
Course Title Additional	
Scientific-Disciplinary Sector	AGRI-07/A
Language	English
Degree Course	PhD Programme in Food Engineering and Biotechnology
Other Degree Courses (Loaned)	
Lecturers	Dr. Edoardo Longo, Edoardo.Longo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/35783
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	3
Teaching Hours	20
Lab Hours	10
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	A) provide an adequate knowledge and a critical approach to the identification of chemical and sensory markers of food processing, packaging and authenticity. B) provide adequate knowledge of the most common multivariate statistical approaches used to study the influence of processing conditions on the composition of food products,with practical examples.
Course Topics	Part A) Recall of basic statistical elements; introduction to and application of exploratory multivariate statistics (e.g., PCA, HCA,

	FA) in food quality data analysis; introduction to other exploratory models (MFA, MCA); Part B) Supervised multivariate classification and discrimination models (eg. SIMCA; LDA); Part C) Multiple and multivariate regression models (MLR, PCR, PLS), and derived methods (PLS-DA). Practical activities: Training and use of software tools for multivariate statistical analysis for applications to data from real food analytical and sensory studies; team working on real datasets; preparation of a presentation.
Keywords	Multivariate statistics, exploratory multivariate analysis, PCA, multivariate classification, multivariate regression
Recommended Prerequisites	Basic knowledge of statistical analysis
Propaedeutic Courses	no
Teaching Format	Frontal lectures, practical exercises
Mandatory Attendance	Mandatory
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding. (a) adequate knowledge and understanding of the application of appropriate statistical tools for studying the chemical and sensory markers of food products quality and authenticity; (b) autonomous ability of devising and applying statistical strategies to investigate the chemical and sensory markers of quality and authenticity of food products; Applying knowledge and understanding. (a) developing the capability of integrating information, both in horizontal way (technological, chemical, biological, and regulatory aspects related to the chemical and sensory analysis of food products) and in vertical way (reasonable sequence of processes affecting the composition of food products for the evaluation of their quality and authenticity); Making judgements. Capability of identify critical parameters in order to improve the efficiency of the chemical and sensory analysis of food products; Communication skills.

	Capability of clearly and exhaustively communicate notions, ideas, problems and technical solutions by interpreting and integrating the results of chemical and sensory analyses of food products to interlocutors, either professional or not, representative of the various and specific competencies in the food supply chain (agronomist, engineers, biologists, chemists, nutritionists, administrators) Learning skills. Ability to achieve independence in the evaluation of statistical tools for the analysis of chemical and sensory data from food products, with an appropriate level of autonomy in the interpretation of results.
Specific Educational Objectives and Learning Outcomes (additional info.)	Knowledge and understanding. (a) adequate knowledge and understanding of the application of appropriate statistical tools for studying the chemical and sensory markers of food products quality and authenticity; (b) autonomous ability of devising and applying statistical strategies to investigate the chemical and sensory markers of quality and authenticity of food products; Applying knowledge and understanding. (a) developing the capability of integrating information, both in horizontal way (technological, chemical, biological, and regulatory aspects related to the chemical and sensory analysis of food products) and in vertical way (reasonable sequence of processes affecting the composition of food products for the evaluation of their quality and authenticity); Making judgements. Capability of identify critical parameters in order to improve the efficiency of the chemical and sensory analysis of food products; Communication skills. Capability of clearly and exhaustively communicate notions, ideas, problems and technical solutions by interpreting and integrating the results of chemical and sensory analyses of food products to interlocutors, either professional or not, representative of the various and specific competencies in the food supply chain (agronomist, engineers, biologists, chemists, nutritionists, administrators)

	Learning skills. Ability to achieve independence in the evaluation of statistical tools for the analysis of chemical and sensory data from food products, with an appropriate level of autonomy in the interpretation of results.
Assessment	At the end of the course the students, divided in groups (2 to 4 persons max.), will give the class presentations of a case stud of their choice, highlighting their understanding of theoretical and practical aspects seen during the lectures.
Evaluation Criteria	n/a
Required Readings	Keynotes and scientific publications provided by the lecturer. Some material is also available on Teams (course page) upon enrollment.
Supplementary Readings	“Chemometrics in Food Chemistry” (ed. Federico Marini); “Chemometrics with R” (ed. Springer); “Introduction to Multivariate Statistical Analysis in Chemometrics” (ed. CRC Press); other specific learning material proposed during the lectures
Further Information	Participants will work in groups during the lectures hours on a project (application of the seen methodologies on a dataset of choice), which will be presented the last day of the course. The presentation should be organized as if delivered to a scientific conference. The lecturer can provide data for testing and exercise. Further information will be provided at the beginning of the lectures.
Sustainable Development Goals (SDGs)	Quality education