

General Information	
Academic subject	Starters selection and predictive microbiology
Degree course	Master degree: Food Science and Technology (LM70)
Curriculum	
ECTS credits	6 ECTS (5 ECTS Lectures + 1 ECTS Laboratory)
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Pasquale Filannino	pasquale.filannino1@uniba.it	AGR/16

ECTS credits details			
Basic teaching activities	5 ECTS Lectures	1 ECTS Laboratory	

Class schedule	
Period	Second semester
Year	First
Type of class	Lectures- Laboratory

Time management	
Hours	150
In-class study hours	54
Out-of-class study hours	96

Academic calendar	
Class begins	March 1 st , 2022
Class ends	June 17 th , 2022

Syllabus	
Prerequisites/requirements	Knowledge of Biochemistry, General Microbiology, Food Chemistry. Knowledge of the main food technologies and food supply chains. Basic knowledge of Mathematics and Statistics.
Expected learning outcomes	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Knowledge of the criteria for selection of natural and commercial microbial starter for the food industry; ○ Knowledge of the main advanced microbiological methods for selection and production of microbial starter; ○ Knowledge of the main models available for predictive microbiology applied to the food sector. <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Mastership of advanced microbiological techniques for the selection and preparation of natural and commercial microbial starter for the food industry ○ Mastership of mathematical modelling techniques able to describe the microbial evolution in food products, depending on known and measurable environmental conditions <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Ability to manage the selection process of microbial starter according to the process and product variables. ○ Ability to develop and apply models and to predict the growth of microorganisms in certain environmental conditions ○ Ability to provide a critical interpretation of the results of microbiological analyses on food, aimed at the prediction of

	<p>microbial growth, the evaluation of the effects of sanitization treatments (thermal and non-thermal), the evaluation of the commercial shelf-life of foods and food safety.</p> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability to communicate the acquired theoretical concepts in oral and written form, using appropriately the scientific language and the specific lexicon of predictive microbiology ○ Ability to describe, also through applicative cases, the practical aspects and potential effects of this discipline on the research and development and quality control activities in food industry. <p><i>Capacities of continue learning</i></p> <ul style="list-style-type: none"> ○ Ability to deepen and update knowledge regarding the application of starter microorganisms in the food industry, and the criteria for their selection ○ Ability to deepen and update knowledge regarding mathematical modelling techniques and predictive microbiology applied to the food industry. <p>The expected learning outcomes, in terms of knowledge and skills, are shown on Annex A of the Teaching Regulations of the Master's Degree Program (expressed through the European Descriptors of the qualification).</p>
Contents	<ul style="list-style-type: none"> ● Microbial starters for the agro-food production: dairy products, fermented beverages, leavened baked products, fermented meat-based products, wine, fermented pickles, and functional foods. Illustrative case studies. ● Criteria for microbial starters selection. ● Microbial starters production. ● Scopes and development of predictive microbiology. ● Mathematical models and microbial growth. ● Microbiological risk and predictive models. ● Primary models: microbial growth curves. Gompertz equation, Barany model logistic equation, Weibull model. ● Secondary models: experimental drawings for the evaluation of multiple effects on microbial growth, Ratkowsky model. ● Tertiary models: tools for modeling and databases.
Course program	
Bibliography	<ul style="list-style-type: none"> ● Lecture notes and educational supplies provided during the course ● Scientific papers ● Gardini, F., & Parente, E. (2013). Manuale di microbiologia predittiva. Italia: Springer-Verlag.
Notes	
Teaching methods	Lectures will be presented through digital tools (PowerPoint presentation, video). Laboratory classes will be performed.
Assessment methods (indicate at least the type written, oral, other)	<p>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).</p> <p>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.</p>

	<p>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.</p> <p>Non-Italian students may be examined in English language, according to the aforesaid procedures.</p>
<p>Evaluation criteria</p>	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Describing the criteria for selection of natural and commercial microbial starter for the food industry; ○ Describing the main advanced microbiological methods for the selection and preparation of microbial starter; ○ Describing the main models available for predictive microbiology applied to the food sector. <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Applying advanced microbiological techniques to the selection and preparation of natural and commercial microbial starter for the food industry; ○ Applying mathematical modelling aimed to describe microbial evolution in food products, depending on known and measurable environmental conditions. <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Managing the selection process of the microbial starter according to the process and product variables. ○ Developing and applying formal models to predict the growth response of microorganisms in specific environmental conditions ○ Providing a critical interpretation of the results of microbiological analyses of food, aimed at the prediction of microbial growth, the evaluation of the effects of sanitization treatments (thermal and non-thermal), the evaluation of the commercial shelf-life of foods and food safety. <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Communicating the theoretical concepts acquired using the appropriate scientific language and the specific lexicon of predictive microbiology; ○ Describing, also through applicative cases, the practical aspects and potential consequences of this discipline on the research and development and quality control activities in food industry. <p><i>Capacities of continue learning</i></p> <ul style="list-style-type: none"> ○ Design a practical approach for the selection of microbial starter according to specific process and product variables. ○ Making hypothesis on the application of mathematical modeling for the interpretation of the results of microbiological analysis carried out on food, the effects of sanitizing treatments, commercial shelf-life and food safety.
<p>Further information</p>	<p>Visiting hours: from Monday to Thursday 9.00 a.m. – 17.30 p.m. by appointment only.</p>