

General Information	
Academic subject	<u>Agricultural microbiology</u> (Technologies for Agri-food Manufacturing I.C.)
Degree course	Agricultural science and technology
Curriculum	
ECTS credits	3 (2 Lectures + 2 practical)
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	<b>Carlo Giuseppe Rizzello</b>	carlogiuseppe.rizzello@uniba.it	AGR/16

ECTS credits details	
Basic teaching activities	3

Class schedule	
Period	Second semester
Year	Third
Type of class	Lectures Practical lessons Guided tours to agri-food industries

Time management	
Hours	80
In-class study hours	30 (18 Lessons + 12 Practical lessons)
Out-of-class study hours	40

Academic calendar	
Class begins	24 <sup>th</sup> February 2020
Class ends	12 <sup>th</sup> June 2020

Syllabus	
Prerequisites/requirements	Knowledge on Chemistry and Biochemistry.
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Knowledge of chemical components and basic biological structures related to the main raw materials used in the agri-food industry for food production.</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to autonomously identify suitable biotechnologies for processing, hygiene and food safety to be applied to production processes and agri-food products.</li> <li>○ Ability to identify and carry out biotechnological interventions aimed at obtaining appropriate qualitative (organoleptic, technological, hygienic and nutritional) standards of fermented food products.</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Ability to interpret the results of analytical controls and to adjust the parameters of fermentation processes to the achievement of defined quality standards.</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to communicate the importance and role of microorganisms and the purpose of biotechnological processes for the control and processing of raw materials in foods, in order to obtain specific quality standards.</li> </ul> <p><i>Capacities to continue learning</i></p>

	<p>The expected results of learning, in terms of knowledge and skills, are listed in the Annex A of the Teaching Regulations of the bachelor (expressed by means of the European Descriptors of the bachelor in Agricultural Science and Technology) and are summarized as follows:</p> <ul style="list-style-type: none"> <li>○ Ability to update and deepen self-knowledge of food biotechnological processes through the study of scientific publications in the microbiological field, with particular focus to applications in oenology, dairy and leavened baked goods.</li> </ul>
Contents	<ul style="list-style-type: none"> <li>○ Ecophysiology of microorganisms: intrinsic and extrinsic factors which influence microbial growth. Environmental adaptation responses.</li> <li>○ Control of microorganisms in foods: use of chemicals, radiations, low and high temperatures, drying and filtration.</li> <li>○ Concepts on dairy, oenological and leavened baked goods microbiology.</li> <li>○ Microorganisms and fertility of the soil.</li> <li>○ Direct and indirect approaches for determining the number of microorganisms; Analytical evaluation of the trend of fermentative processes by the study of microbial growth and metabolomics.</li> </ul>
Course program	
Bibliography	<ul style="list-style-type: none"> <li>○ Lectures notes</li> <li>○ Farris, Gobetti, Neviani, Vincenzini. Microbiologia dei prodotti alimentari, Casa Editrice Ambrosiana (2012);</li> <li>○ Biavati B. e C. Sorlini. Microbiologia Generale e Agraria. Casa Editrice Ambrosiana. 2007</li> <li>○ Madigan, M.T., J.M. Martino e J. Parker. Brock. Biologia dei Microorganismi (traduzione italiana della 10a edizione di Brock Biology of Microorganisms), 2003.</li> <li>○ Jay, J.M. Modern Food Microbiology. 5.a ed. London: Chapman &amp; Hall International Thomson Publishing (1997).</li> <li>○ I pani tipici. Biotecnologia dei prodotti lievitati da forno. p. 263-283, MILANO: Casa Editrice Ambrosiana, ISBN/ISSN: 978-88-08-18121-3.</li> <li>○ De Felip, G. Recenti Sviluppi di Igiene e Microbiologia degli Alimenti. Milano: Tecniche Nuove (2001).</li> </ul>
Notes	
Teaching methods	<p>Topics will be discussed through:</p> <ul style="list-style-type: none"> <li>○ lessons that discuss the teaching material and data presented with the help of PowerPoint.</li> <li>○ Practical lessons</li> <li>○ Guided tours at agri-food companies</li> </ul>
Assessment methods	<p>The final exam, unique, total and collegial, for the Technologies of Agri-food Manufacturing I.C., consists of an oral test on the topics of both modules ("Agri-food Industries" and "Agricultural Microbiology"). Marks are out of 30, as defined in the Didactic regulations of the bachelor in Agricultural Science and Technology (article 9) and in the syllabus (Annex A).</p> <p>The evaluation of the student's preparation is based on established criteria, as detailed in Annex A of the Didactic regulations of the bachelor program.</p> <p>For the final exam, the oral test aims at evaluating the knowledge and skills obtained on the course of both modules. The positive outcome of the oral test will result in the final evaluation of the examination, which will be expressed as the arithmetic mean of the oral tests of the two modules.</p> <p>For students enrolled in the academic year of the course, there is an</p>

	<p>oral exemption test related to the topics of lessons and exercises conducted in the period preceding the test (about half the program). Examination for Agricultural Microbiology module is overcome if the student shows at least sufficient preparation, a level of knowledge appropriate to the minimum level of requirements, sufficient mastery of acceptable subject matter and language, and ability to analyse problems and structure of the arguments and has also successfully passed the exemption test of Agri-food Industries. The positive outcomes of the exemption tests of both modules contribute to the evaluation of Technologies of Agri-food Manufacturing I.C. and have the validity of an academic year.</p> <p>For students eligible for exoneration, the final oral exam will only cover the topics of lessons and exercises carried out during the period following the exemption test. In this case, the assessment of the final exam is expressed as the mean between the mark of the exemption and the final tests.</p> <p>For foreign students the exam can be done in English.</p>
<p>Evaluation criteria</p>	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Knowledge of the growth and control parameters of microorganisms and the main biotechnological processes for the production of fermented foods</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to describe, select and manage the growth of microorganisms and the main biotechnological processes for the production of fermented foods.</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Understand, select and manage the major biotechnological processes for the production of fermented foods by analyzing biochemical, microbiological and process parameters.</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describe the layout of biotechnological processes by identifying critical points and the most appropriate management strategies.</li> <li>○ Describe hypothetical biotechnological processes according to the compositional characteristics of the raw material and the desired characteristics for the finished product.</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Gaining knowledge of this module is verified during lectures, practical lessons and guided tours. It is also verified through the case studies proposed during learning activities.</li> </ul>
<p>Further information</p>	<p>Office hours: Monday - Friday, after appointment, at the Department of Soil, Plant and Food Sciences, to be agreed by e-mail.</p>