

General information	
Academic subject	<b>APPLIED MICROBIOLOGY</b> (integrated exam of APPLIED MICROBIOLOGY AND PARASITOLOGY)
Degree course	Foods of animal origin safety and health - (LM86)
Academic Year	2022/2023 – I year
European Credit Transfer and Accumulation System (ECTS)	: 5+1E
Language	italian
Academic calendar (starting and ending date)	I semester
Attendance	No

Professor/ Lecturer	
Name and Surname	Gabriella Elia
E-mail	<a href="mailto:gabriella.elia@uniba.it">gabriella.elia@uniba.it</a>
Telephone	080.4679805
Department and address	Campus of Veterinary Medicine, S.P. 62 to Casamassima km 3, 70010 Valenzano (Ba)
Virtual headquarters	Teams code: a6wmjfg - Attività tutoria: microbiologia applicata - LM86
Tutoring (time and day)	Tuesday 2p.m. —4 p.m. Friday 10 a.m. —1 p.m. In presence or in remot

Syllabus	
<b>Learning Objectives</b>	The course aims at providing more in-depth knowledge on the major fundamentals of microbiology with emphasis on microbial ecology, interactions of microorganisms with environment and host, intrinsic and extrinsic factors affecting microbial growth especially in food systems. Overall these concepts represent tools to understand the applications of microbiology in food safety, production, processing, preservation, and storage. Lectures and lab practicals are devoted to prepare the students to applicative approaches and to lab activity in microbiology.
<b>Course prerequisites</b>	Students must review the concepts that refer to Biology and General Microbiology. The student can take the exam of the Applied Microbiology module only after having successfully passed that of Parasites, Fungi and Food Pests.
<b>Contents</b>	Course program: Definition and Aims of teaching in the context of the Degree Course Microbiological laboratories: organization and management. Laboratory equipment for microbiological analysis; optical and electron microscopy. Biosafety and Biosecurity. Basic information on prokaryotic cells. Microbial ecology: interactions of microorganisms with environment and host; intrinsic and extrinsic factors affecting microbial growth. Methods for sterilization. Disinfectants and antiseptics. Microbial genetics. Mutations and mutants. Horizontal gene transfer mechanisms. Bacterial growth curve. Antibiotics: structure and mechanisms of action. Overview on resistance mechanisms. Selected examples of microorganisms relevant in food hygiene. <i>C. botulinum</i> , <i>C. perfringens</i> ; <i>S. aureus</i> ; <i>B. cereus</i> ; Enterobacteriaceae: <i>Escherichia coli</i> ; <i>Salmonella</i> spp; <i>Shigella</i> spp; <i>Y. enterocolitica</i> ; <i>Campylobacter</i> spp. Probiotic Microorganisms. Starter cultures; Microorganism as indicator of food quality. Biological sample collection, processing, storage and information management. Food sampling and surface sample methods.

	Bacteria Testing and Investigation: Principles of Isolation, Cultivation, and Identification of Bacteria. Bacterial counting methods. Bacteria identification techniques: morpho-cultural characteristics and biochemical tests; Maldi-tof. Basic information on viruses. Enteropathogenic Viruses. Diagnostic methods in virology: virus isolation and identification. Direct and indirect diagnostic tests: Haemagglutination and Haemagglutination Inhibition Tests; Enzyme Linked Immunoassay (ELISA); Immunofluorescence; Agar-gel immunodiffusion (AGID). The principle and method of polyacrylamide gel electrophoresis: SDS-PAGE and Western blotting. Molecular methods: DNA and RNA extraction, PCR, Real-time PCR.
<b>Books and bibliography</b>	Poli, Cocilovo, Microbiologia ed immunologia veterinaria, UTET, 2° ed. 2005. LA PLACA M., Microbiologia generale e applicata, ESCULAPIO Slides provided by teacher during the course and lecture notes
<b>Additional materials</b>	

<b>Work schedule</b>			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b>Hours</b>			
<b>150</b>	<b>60</b>	<b>25</b>	<b>65</b>
<b>ECTS</b>			
<b>6</b>	<b>5</b>	<b>1</b>	
<b>Teaching strategy</b>			
The lessons will be held in presence with the help of slide shows. Practical laboratory training will be organized in order to enable each student to perform isolation and identification of specific pathogens and to use the main serological techniques. Considering the average number of students enrolled in the course, laboratory sessions will require the replication of the hours of exercises in at least 4 shifts. The course is not provided in e-learning mode.			
<b>Expected learning outcomes</b>			
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>○ To know ecological factors influencing bacterial growth</li> <li>○ To know the pro-technological or altering role of microorganisms</li> <li>○ To know the main microbiological techniques for the isolation and identification of microorganisms</li> <li>○ To know the main microbial groups in food</li> </ul>		
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>○ Ability to apply microbiological knowledge to define and interpret the results of a microbiological analysis</li> <li>○ Ability to apply microbiological knowledge to the understanding and implementation of technological processes and storage conditions, food safety and stability over time</li> <li>○ Ability to apply biosafety concepts to implement good laboratory practice</li> </ul>		
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>● Making informed judgments and choices <ul style="list-style-type: none"> <li>○ Ability to analyze critical issues in operating practice</li> <li>○ Ability to independently address topical subjects more in depth</li> <li>○ Ability to work and think independently</li> <li>○ Ability to handle difficult or unexpected situations in the workplace</li> </ul> </li> <li>● Communicating knowledge and understanding <ul style="list-style-type: none"> <li>○ Ability to adopt different language registers, including technical-scientific registers to communicate adequately experimental results</li> <li>○ Ability to work in teams or groups, improving communication skills and</li> </ul> </li> </ul>		

	<p>managing conflict</p> <ul style="list-style-type: none"> <li>• Capacities to continue learning             <ul style="list-style-type: none"> <li>○ The ability to study scientific papers independently.</li> </ul> </li> </ul>
<b>Assessment and feedback</b>	
Methods of assessment	<p>Learning assessment methods will be carried out:</p> <ul style="list-style-type: none"> <li>- during the course, by flip teaching sessions during the which it will be assessed the ability to think independently</li> <li>- by a final oral examination during the which the student must demonstrate the ability to integrate different aspects of microbiology. The oral exposure ability and the correct use of scientific terminology are also evaluated.</li> </ul>
Evaluation criteria	<ul style="list-style-type: none"> <li>• Knowledge and understanding             <ul style="list-style-type: none"> <li>○ Ability to clearly express the acquired knowledge</li> </ul> </li> <li>• Applying knowledge and understanding             <ul style="list-style-type: none"> <li>○ Ability to link different disciplines and provide appropriate examples</li> </ul> </li> <li>• Autonomy of judgment             <ul style="list-style-type: none"> <li>○ Analytical and synthetical attitudes evaluation</li> </ul> </li> <li>• Communicating knowledge and understanding             <ul style="list-style-type: none"> <li>○ Clarity of presentation</li> <li>○ Oral exposure ability and the correct use of scientific terminology</li> </ul> </li> <li>• Communication skills             <ul style="list-style-type: none"> <li>○ Oral exposure ability and the correct use of scientific terminology</li> </ul> </li> <li>• Capacities to continue learning             <ul style="list-style-type: none"> <li>○ Ability to rework knowledge and transfer it to new and different situations</li> </ul> </li> </ul>
Criteria for assessment and attribution of the final mark	<p>The performance of a student will be assessed by an oral exam on topics included in the program. The Minimum passing grade is 18/30 and analytical and synthetical attitudes of the students and his /her language skills will be also part of the final judgment. The results of the Applied Microbiologist test and of the Parasites, fungi and food pests test will contribute to the definition of the final grade. The final evaluation will be the result of the collegial judgment relating to the two partial tests and will be considered passed with a score equal to or greater than 18.</p>
<b>Additional information</b>	