General Information	BACELOR DEGREE IN BIOTECHONOLOGIES
Title of the subject	Microbiology
Degree Course (class)	Industrial and Agri-food Biotechnologies (L-2)
ECTS credits	6
Compulsory attendance	Yes
Language	Italian
Academic year	2020-2021

Subject Teacher		
Name and Surname	Isabella Pisano	
email address	isabella.pisano@uniba.it	
Place and time of reception	Campus, Via Orabona 4, Palazzo di Farmacia, Friday 12:00 a.m.	
ECTS credits details	Discipline sector (SSD)	Area
	CHIM/11	---

Study plan schedule	Year of study plan	Semester
	2^	2^

Time management	Lessons	Laboratory	Exercises	Total
CFU	4	2		6
Total hours	100	50		150
In-class study hours	32	24		56
Out-of-class study hours	68	26		94

Syllabus	
Prerequisites / Requirements	
Citology Genetics and Biochemistry	
Expected learning outcomes (according to Dublin descriptors)	
Knowledge and understanding	Through the use of different bibliographical sources (scientific texts, scientific literature, current affairs), the student will be encouraged to acquire essential tools for his profession, with particular reference to the following specific objectives: • Knowledge of microbial ecology and interactions of micro-organisms with the environment. • Know the microbial diversity and describe the dissimilative and assimilative metabolic activities of microorganisms • To know the conditions of survival and development of pathogenic and non-pathogenic micro-organisms and to be able to determine experimentally their presence and charge.
Applying knowledge	The course aims to provide methodological approaches and basic

	techniques to be applied to the needs of the profession of biotechnology, with particular emphasis on the most relevant aspects for entry into the labour market and professional success. In detail, the following objectives are envisaged: • Acquire the skills necessary to move safely in a microbiology laboratory, the manual skills required for microbiological analysis and the elements necessary for the interpretation of the results. • Apply microbiological knowledge to the design and validation of new processes and products of interest in the biotechnology industry.
Making informed judgments and choices	• Recognize and describe principles and limits of microbial growth control methods, with particular reference to environmental sustainability and ethical-social issues. • Demonstrate judgement in specific situations of analysis of strategies for the control of microbial growth.
Communicating knowledge	Be able to describe the biotechnological properties of micro-organisms in a comparative and critical manner. This ability must be acquired both with reference to communication to professional entities and for disclosure purposes.
Capacities to continue learning	Through the lectures and laboratory experiences, the student will be stimulated to make contact with the specific problems of the profession, in order to develop problem solving strategies. The student will be encouraged to actively participate in the learning and refresher actions planned by the course of studies.
Study Program	
Content	• Part I - Microbial diversity. Taxonomy and phylogeny. Microbial ecology. Structure and functions of microbial cells. Cell membrane and cell wall. Microbial locomotion. Surface structures and cellular inclusions in prokaryotes. Endospores. Structures of eukaryotic microorganisms. Fungi and algae. Mycelium, hyphae and conidae. Sexual spores and assessuate. • Part II - Metabolic diversity. Assimilation and dissimilation. Carbon cycles of oxygen and other fundamental elements. Chemiolitotrophy. Oxidation of hydrogen. Oxidation of reduced sulfur compounds. Oxidation of iron. Nitrification and anammonox. Anaerobic respiration. Nitrate reduction and denitrification. Sulfate reduction. Acetogenesis and methanogenesis. Inorganic and organic electron acceptors. Fermentations: energy and oxidation considerations. Diversity of fermentative processes. Symprophy. Methadone and methylotrophic. Nitrogenase and nitrogen fixation process. Photosynthesis. Oxygenic and anoxygenic phototrophy. Autotrophic fixation of CO2. • Part III- Interactions of microorganisms with the environment and higher organisms. Positive interactions with plants and animals. Pathogenicity. Virulence factors and toxins. Quorum sensing. Physical and chemical methods for the control of microbial growth. • Laboratory experiences Microscopic observation of microorganisms. Gram staining. Microbial growth. Vital counts and total counts. Mc Conkey plates. Microbial identification by API. Antibiogram.

Bibliography and textbooks	Brock-Biologia dei microrganismi: microbiologia generale, ambientale e industriale. Madigan et al. Pearson. XIV edizione
Notes to textbooks	
Teaching methods	Lectures in the classroom and laboratory experiences.
Assessment methods (oral, written, ongoing assessment)	Oral
Evaluation criteria (describe criteria for each of the above expected outcomes)	Students must be able to express the concepts related to the topics of the course using an appropriate language also in the choice of scientific terms that must be consistent with the terminology of the discipline. Students must know the following topics: •Structure and function of micro-organisms. •Ecological and metabolic diversity of micro-organisms. •Knowledge of replication strategies and methods for controlling microbial growth. •Overview of applications of micro-organisms in bioindustry. •Acquisition of basic microbiological techniques.
Further information	