UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2018/2019		
BACHELOR'S DEGREE (BSC)	BIOTECHNOLOGIES		
INTEGRATED COURSE	MICROBIOLOGY AND APPLIED BIOTECHNOLOGIES - INTEGRATED COURSE		
CODE	15237		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/03, BIO/19		
HEAD PROFESSOR(S)	PALLA FRANCO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	PALLA FRANCO	Professore Associato	Univ. di PALERMO
	GALLO GIUSEPPE MIRKO NAZARENO	Professore Associato	Univ. di PALERMO
CREDITS	12		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**GALLO GIUSEPPE MIRKO NAZARENO** Tuesday 9:30 12:30 Studio docente, Dipartimento STEBICEF, Viale delle Scienze, Edificio 16, 90128, Palermo Thursday 9:30 12:30 Studio docente, Dipartimento STEBICEF, Viale delle Scienze, Edificio 16, 90128, Palermo **PALLA FRANCO** Monday 15:00 17:00 Studio del docente, Dipartimento STEBICEF - Sez Botanica ed Ecologia vegetale, via Archirafi 38 - I piano, 90123 Palermo Wednesday 15:00 17:00 Studio del docente, Dipartimento STEBICEF - Sez Botanica ed Ecologia vegetale, via Archirafi 38 - I piano, 90123 Palermo Friday 14:00 16:00 Studio del docente, Dipartimento STEBICEF - Sez Botanica ed Ecologia vegetale, via Archirafi 38 - I piano, 90123 Palermo		

DOCENTE: Prof. FRANCO PALLA

PREREQUISITES	Students should have the knowledge acquired during the academic studies with particular reference to the teachings of the Biological and Chemical fields, as well as being able to process the information received, describing critically the possible implications
LEARNING OUTCOMES	Knowledge and understanding The course addresses morphological, functional, molecular, metabolic, biochemical, ecological and environmental concerns of microbial biology. Particular emphasis will be given to molecular aspects related to biochemical and metabolic capabilities, such as production of molecules and macromolecules of pharmaceutical, industrial and food interests, and associated with microbial biodiversity and biotechnology. Understanding the nucleic acids structure, the molecular mechanisms related to DNA replication, RNA transcrition and Protein translation. Recognize the in vitro – in vivo DNA duplication peculiarities. Evaluate the impact of GMO on human health, environments and biodiversity Identify and quantify the presence transgenes in GM plants and derivated products. Ability to identify specific genomic DNA sequences for studis of micro and macro biodiversity. Applying knowledge and understanding Acquisition of skills that allows to: analysis and biotechnological experiments; quality control; development of molecular tests; production of vectors and engineered systems; application of microbiological techniques as service supports to agriculture, phamaceutical and medical bio-researches. Analyze genetically modified micro and macro organisms, by molecular protocols. The course aims to make the student able to assimilate and critically elaborate the acquired knowledge, aimed at using molecular technologies. Judgement skills. Acquisition of skills on: evaluation and interpretation of experimental data and laboratory process also related to the safety, scientific approach in the fields of microbiology and molecular biology, closely related to the development of innovative biotechnological methods. Students are led to evaluate under a critical and responsible manner the issues addressed during the lectures and laboratory activities, as well as enrich their judgment through the reading and discussion of publications in scientific journals. Communicative abilities Acquisition of adequate knowledge and tools for scientific communication in Italian and English languages, also concerning computer skills, processing, presentation and discussion of experimental data, capability to work in team. The course aims to develop the student's ability to present by a clear and rigorous method, the knowledge learned. Learning ability Acquisition of adequate criteria for the deepening development of skills, as: librarian sources, access to databases and other informations on the net by bioinformatics tools. Learning progress will be monitored throughout open discussions in both classroom and laboratory. Reaching high levels of knowledge on tools and strategies for implementation of biological disciplines.
ASSESSMENT METHODS	Oral examination. The learning is assessed through an interview. In this oral examination the student must answer to at least three questions on the topics of the course, and they have to show an adequate knowledge, acquisition of interpretative skills, capacity of connecting and processing the arguments, as well as a relevant presentation capacity. The final grade will be expressed in thirtieth and will be judged insufficient when the student will demonstrate: difficulty to focus on the proposed topics, a shallow knowledge of the arguments and extreme limited exposure ability. As the degree of details of the proven knowledge increase will proportionally increase the positivity of the grade. The maximum score is obtained in case of excellent mastery and critical-interpretative jurisdiction of the subject content of the course and a good exposition proved by the use of proper scientific terminology.
TEACHING METHODS	Classroom lessons, Laboratory exercises.

MODULE
MOLECULAR BIOTECHNOLOGIES

Prof. FRANCO PALLA

SUGGESTED BIBLIOGRAPHY	
AMBIT	10643-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	47
COURSE ACTIVITY (Hrs)	28
EDUCATIONAL OBJECTIVES OF THE MODULE	

SYLLABUS

Hrs	Frontal teaching
2	2 Hypogeal environments: revealing of microbial taxa in patinas and biofilms
3	Aerosol of conservation /fruition environments, sampling (gelatine membrane) and identification of microorganisms detrimental both for cultural assets and human health.
3	Removal of coherent and incoherent layers. Bioclening by viable bacterial cells or purified enzymes. Enzymes structure and specificity of action.
4	Characteristics and selective criteria of enzymes in relation to the undesired layers. Hydrolasis (amylase, esterase, lipase, protease) useful in restoration projects.
2	State of the art of enzymes for restoration of organic (paper, painting on wood or canvas) and inorganic (frescoes) manufacts
4	Different "dirt" patinas detectable on artworks surface and adequated removal strategies.
3	Selection of experimental condition specific for enzyme application: temperature, salt condition, supports (gel, Nylon membrane).
2	Green conservation: novel biological molecules with enzymatic or biocidal activity.
2	Blak-crust: bio-removal by viable bacterial cells.
2	Attention and Risk indexes, works of art/human.
4	Waterlogged findings: conservative problem for ex situ and in situ conservation and sustainable fruition.
2	Ancient DNA
2	Morphological and molecular investigation on archaeological findings
4	Detection and identification of biodeteriogens through technological protocols based on the analysis of microbial DNA
3	In vitro culture: liquid and solid media by samples from woks of arts surface and deep layers.
2	Sample preparation and observation by optical (OM), scanning electron (SEM) and confocal (CLSM) microscopy

MODULE
GENERAL AND APPLIED MICROBIOLOGY

Prof. GIUSEPPE MIRKO NAZARENO GALLO

SUGGESTED BIBLIOGRAPHY

Willey M., Sherwood M., Woolverton J. (2009) PRESCOTT 1, Microbiologia Generale, McGraw-Hill
Farris G.A., Gobbetti M., Neviani E., Vincenzini M. (2012) Microbiologia dei prodotti alimentari, Casa Editrice Ambrosiana

AMBIT	50081-Discipline biotecnologiche con finalità specifiche: biologiche e industriali
INDIVIDUAL STUDY (Hrs)	145
COURSE ACTIVITY (Hrs)	80

EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to provide detailed knowledge on selected bacterial strains as starter cultures to be applied for food productions through the study of the morphology, physiology, genetics and microbial taxonomy and understanding of the main functions of the microbial groups of agricultural environment and foods carried out by large scale production. The course, through laboratory sessions, aims to provide the student manual skills necessary to start working in a microbiology laboratory and to perform quantitative and qualitative analyses of agricultural and food samples. The laboratory activities will focus on genotypic characterization of bacteria and yeast strains.

SYLLABUS

Hrs	Frontal teaching
1	History of food microbiology and focus on the role of biotechnology on food environment
1	Main features of selected bacterial strains with technological characteristics associated to food productions
1	Main features of spoilage and pathogen bacterial strains associated to food productions
1	The microbial strain starter: taxonomy, identification, selection and application
3	Microbiology and biotechnology on food beverage obtained at large-scale production: yeasts, lactic acid bacteria, innovative methods to improve the quality of foods spontaneously fermented
3	Microbiology and biotechnology on dairy foods obtained at large-scale production: lactic acid bacteria selected as starter and non-starter cultures, microbial biofilms to improve the lactic acid fermentations performed by autochthonous selected strains
2	Microbiology and biotechnology on fermented meats obtained at large-scale production: lactic acid bacteria, yeasts and filamentous fungi, staphylococci, micrococci, innovative protocol to produce "salami"
2	Biotechnology on fermented table olives: lactic acid bacteria, yeasts and industrial productions
2	Biotechnology on fermented bakery products: "sourdoughs" and autochthonous selected lactic acid bacteria for large-scale productions of typical bread
2	Selected strains, microbial metabolisms and innovative method to produce functional and nutraceutic foods
4	Genotypic methods to identify at species and strain level microbial cultures associated to foods

Hrs	Practice
8	Counts, isolation of microorganisms, morphological analysis and grouping of isolates, physiological and biochemical characterization of the main microorganisms associated to foods. Basis of phylogenetic analysis for detailed identification of microorganisms and technological selection of starter cultures