



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2019/2020		
BACHELOR'S DEGREE (BSC)	BIOLOGICAL SCIENCES		
SUBJECT	MICROBIOLOGY WITH PRACTICE		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50027-Discipline biomolecolari		
CODE	15886		
SCIENTIFIC SECTOR(S)	BIO/19		
HEAD PROFESSOR(S)	PRESENTATO ALESSANDRO ALDUINA ROSA	Ricercatore a tempo determinato Professore Associato	Univ. di PALERMO Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	7		
INDIVIDUAL STUDY (Hrs)	115		
COURSE ACTIVITY (Hrs)	60		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	3		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>ALDUINA ROSA</p> <p>Monday 13:00 14:00 Studio 306, Dip. STEBICEF, viale delle Scienze, Ed. 16, piano -1 Disponibile su TEAMS previo appuntamento concordato via email</p> <p>Thursday 13:00 14:00 Studio 306, Dip. STEBICEF, viale delle Scienze, Ed. 16, piano -1 Disponibile su TEAMS previo appuntamento concordato via email</p> <p>Friday 12:00 13:00 Studio 306, Dip. STEBICEF, viale delle Scienze, Ed. 16, piano -1 Disponibile su TEAMS previo appuntamento concordato via email</p> <p>PRESENTATO ALESSANDRO</p> <p>Friday 15:00 17:00 Studio del docente piano -1, edificio 16 di viale delle scienze, sezione di genetica e microbiologia Inoltre, il docente propone la possibilità di effettuare ricevimenti in modalità telematica (piattaforma teams). Contattare il docente per fissare giorno e orario di ricevimento.</p>		

DOCENTE: Prof. ALESSANDRO PRESENTATO- *Lettere L-Z*

PREREQUISITES	Knowledge of cytology, molecular biology, genetics and biochemistry.
LEARNING OUTCOMES	<p>Knowledge and understanding</p> <p>Theoretical knowledge related to biology, morphology, biochemical, cellular and molecular processes, evolution and ecological-environmental aspects of microorganisms.</p> <p>Applying knowledge and understanding</p> <p>Ability to apply methodology, technology and instruments for microbiological analysis in the biomedical, environmental, food, biotechnology and biological research.</p> <p>Making judgements</p> <p>Independence of judgment in relation to the evaluation and interpretation of experimental laboratory data; Safety in the laboratory; principles of professional ethics and scientific approach to bioethical issues.</p> <p>Communication</p> <p>Tools for communicating in English by directly analyzing research articles on bacterial processes and systems.</p> <p>Lifelong learning skills</p> <p>Adequate capacity for the development and deepening of skills, regarding consultation of bibliography, access to databases and other information on the net, using bioinformatics tools.</p>
ASSESSMENT METHODS	<p>Oral exam</p> <p>Learning evaluation will be performed by an individual interview. During the oral exam the student must answer at least three questions, regarding the arguments developed during the course, and has to show adequate knowledge and interpretive skills of general and specific contents, good capacity of connection and processing of content, as well as a relevant, clear and correct presentation capacity. The final grade will be expressed in thirtieth and will be judged insufficient when the student will demonstrate: difficulty to focus the issues proposed, a shallow knowledge of the arguments and extreme limited exposure ability. As the degree of detail of the knowledge demonstrated by the student will proportionally increase the positivity of the evaluation. The maximum score is obtained in the event of excellent mastery and critical-interpretative jurisdiction of the subject of the course content, associated with good exhibition skills attested by the use of an appropriate scientific terminology.</p>
EDUCATIONAL OBJECTIVES	The course aims to provide students with knowledge of main aspects of bacteriology and general microbiological methods, acquiring appropriate theoretical knowledge and technical elements relating to the biology of microorganisms concerning morphological, functional, cellular and molecular aspects. In addition, it aims to provide students with adequate knowledge of the interactions between microorganisms - eukaryotic organisms (plant and man), useful microorganisms in industrial processes and allows the acquisition of skills and techniques for the diagnosis of microorganisms .
TEACHING METHODS	Lectures and Lab training.
SUGGESTED BIBLIOGRAPHY	<p>-Biologia dei microrganismi. Deho' e Galli. Casa Editrice Ambrosiana.</p> <p>-Brock. Biologia dei Microrganismi vol. 1, 2, 3. Madigan, Martinko, Stahl, Clark.Casa Editrice Pearson.</p> <p>-Laboratorio Didattico di microbiologia a cura di A. Vaughan, P. Buzzini, F. Clementi. Casa Editrice Ambrosiana</p>

SYLLABUS

Hrs	Frontal teaching
6	Introduction to the course; overview of the history of microbiology and its techniques. Prokaryotic and eukaryotic microorganisms. Phylogeny of microorganisms: Archaea and Bacteria
6	Preparation and description of culture media, selective media, isolation in pure culture. The methods of microbiology: sterile conditions, sterilization methods. Staining techniques: Gram staining.
6	Morphology, structure and ultrastructure of the prokaryotic cell. Bacterial cell wall. Flagella. Pili. Fimbriae. Formation and structure of the bacterial spore. Endospore and esospore. Bacterial secretion systems (Yersinia , Agrobacterium).
6	Growth of microorganisms. Microbial nutrition: nutritional requirements, growth factors. Growth curves. Diauxic curve. Environmental factors affecting growth. Metabolism: Production of energy and carbon sources, general principles of metabolism. Fermentation. Aerobic and anaerobic respiration. Glycolysis and alternative routes
6	Bacterial differentiation and "quorum sensing": actinomycetes, Caulobacter, Bacillus subtilis, Vibrio fischeri. Antibiotics: mechanisms of action and resistance mediated by bacterial plasmids and transposons. Ormesis and Pseudomonas aeruginosa.
6	Animal, plant and bacterial viruses. Prions and viroids. Viral replication and titration
6	Introduction to Environmental Microbiology: rhizobia and mutualistic symbiosis. Agrobacterium and transformation of plant cells. Bacillus thuringiensis and pesticides. Bacteria degrading pollutant molecules
6	Basics of Medical Microbiology: diagnostic methods. Endo- and exo - toxins . Immunology principles. Genomic and transcriptomic analysis of bacteria of the microbiota . Applied Microbiology: Analysis of "uncultivable" bacteria. Metagenome analysis.

Hrs	Practice
12	Preparation of media. Sterilization using the autoclave. Preparation of plates. Total and viable count. Preparation of a pure culture. Kirby Bauer method and analysis of results .

DOCENTE: Prof.ssa ROSA ALDUINA- *Lettere A-K*

PREREQUISITES	Knowledge of cytology, molecular biology, genetics and biochemistry.
LEARNING OUTCOMES	<p>Knowledge and understanding</p> <p>Theoretical knowledge related to biology, morphology, biochemical, cellular and molecular processes, evolution and ecological-environmental aspects of microorganisms.</p> <p>Applying knowledge and understanding</p> <p>Ability to apply methodology, technology and instruments for microbiological analysis in the biomedical, environmental, food, biotechnology and biological research.</p> <p>Making judgements</p> <p>Independence of judgment in relation to the evaluation and interpretation of experimental laboratory data; Safety in the laboratory; principles of professional ethics and scientific approach to bioethical issues.</p> <p>Communication</p> <p>Tools for communicating in English by directly analyzing research articles on bacterial processes and systems.</p> <p>Lifelong learning skills</p> <p>Adequate capacity for the development and deepening of skills, regarding consultation of bibliography, access to databases and other information on the net, using bioinformatics tools.</p>
ASSESSMENT METHODS	<p>Oral exam</p> <p>Learning evaluation will be performed by an individual interview. During the oral exam the student will receive questions regarding the subjects developed during the course, and he/she must answer at least three questions, and has to show adequate knowledge and interpretive skills of general and specific contents, good capacity of connection and processing of content, as well as a relevant, clear and correct presentation capacity. The final grade will be expressed in thirtieth and will be judged insufficient when the student will demonstrate: difficulty to focus the issues proposed, a shallow knowledge of the arguments and extreme limited exposure ability. As the degree of detail of the knowledge demonstrated by the student will proportionally increase the positivity of the evaluation. The maximum score is obtained in the event of excellent mastery and critical-interpretative jurisdiction of the subject of the course content, associated with good exhibition skills attested by the use of an appropriate scientific terminology.</p>
EDUCATIONAL OBJECTIVES	The course aims to provide students with knowledge of main aspects of bacteriology and general microbiological methods, acquiring appropriate theoretical knowledge and technical elements relating to the biology of microorganisms concerning morphological, functional, cellular and molecular aspects. In addition, it aims to provide students with adequate knowledge of the interactions between microorganisms - eukaryotic organisms (plant and man), useful microorganisms in industrial processes and allows the acquisition of skills and techniques for the diagnosis of microorganisms .
TEACHING METHODS	Lectures and Lab training.
SUGGESTED BIBLIOGRAPHY	<p>-Biologia dei microrganismi. Deho' e Galli. Casa Editrice Ambrosiana.</p> <p>-Brock. Biologia dei Microrganismi vol. 1, 2, 3. Madigan, Martinko, Stahl, Clark.Casa Editrice Pearson.</p> <p>-Laboratorio Didattico di microbiologia a cura di A. Vaughan, P. Buzzini, F. Clementi. Casa Editrice Ambrosiana</p>

SYLLABUS

Hrs	Frontal teaching
6	Introduction to the course; overview of the history of microbiology and its techniques. Prokaryotic and eukaryotic microorganisms. Phylogeny of microorganisms: Archaeobacteria and Eubacteria
6	Preparation and description of culture media, selective media, isolation in pure culture. The methods of microbiology: sterile conditions, sterilization methods. Staining techniques: Gram staining.
6	Morphology, structure and ultrastructure of the prokaryotic cell. Bacterial cell wall. Flagella. Pili. Fimbriae. Formation and structure of the bacterial spore. Endospore and esospore. Bacterial secretion systems (Yersinia , Agrobacterium).
6	Growth of microorganisms. Microbial nutrition: nutritional requirements, growth factors. Growth curves. Diauxic curve. Environmental factors affecting growth. Metabolism: Production of energy and carbon sources, general principles of metabolism. Fermentation. Aerobic and anaerobic respiration. Glycolysis and alternative routes
6	Bacterial differentiation and "quorum sensing": actinomycetes, Caulobacter, Bacillus subtilis, Vibrio fischeri, Pseudomonas aeruginosa. Quorum sensing in Gram positive e Gram negative bacteria. Antibiotics: mechanisms of action and resistance mediated by bacterial plasmids and transposons. Ormesis. Quorum sensing, tobramycin and biofilm production in Pseudomonas aeruginosa.
6	Animal, plant and bacterial viruses. Prions and viroids. Viral replication and titration .
6	Introduction to Environmental Microbiology: rhizobia and mutualistic symbiosis. Agrobacterium and transformation of plant cells. Bacillus thuringiensis and pesticides. Bacteria degrading pollutant molecules .

SYLLABUS

Hrs	Frontal teaching
6	Basics of Medical Microbiology: diagnostic methods. Endo- and exo - toxins . Immunology principles. Genomic and transcriptomic analysis of bacteria of the microbiota . Applied Microbiology: Analysis of "uncultivable" bacteria. Metagenome analysis.
Hrs	Practice
12	Preparation of media. Sterilization using the autoclave. Preparation of plates. Total and viable count. Preparation of a pure culture. Kirby Bauer method and analysis of results .