

## Degree in Biomedical Laboratory Techniques

### INTEGRATED TEACHING: MICROBIOLOGY AND CLINICAL MICROBIOLOGY

SSD: MED/07, MED/42, VET/06, MED/46

Credits: 8

Coordinator: Daniele Armenia

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MODULE: Microbiology, Bacteriology, Virology

SSD: MED/07

numero di CFU: 4

Professor: Daniele Armenia. [daniele.armenia@unicamillus.org](mailto:daniele.armenia@unicamillus.org)

MODULE: General Parasitology

SSD: VET/06

Credits: 1

Professor: David Di Cave. [David.Dicave@unicamillus.org](mailto:David.Dicave@unicamillus.org)

MODULE: Hygiene and Environmental prevention

SSD: MED/42

Credits: 1

Professor: Fausto Ciccacci [fausto.ciccacci@unicamillus.org](mailto:fausto.ciccacci@unicamillus.org)

MODULE: Technical Sciences of Laboratory Medicine

SSD: MED/46

Credits: 2

Professor: Fabbio Marcuccilli. [Fabbio.Marcuccilli@unicamillus.org](mailto:Fabbio.Marcuccilli@unicamillus.org)

ATTENDANCE MODE: MANDATORY WITH AT LEAST 75% OF PRESENCE DURING THE INTEGRATED COURSE

### PREREQUISITES

Even though no prior exams passed are necessary to follow the course, in order to understand the course, the student should have basic knowledge of immune system, the characteristics of bacterial, fungal, protozoal cells, the concept antibiotic resistance and structure of viruses.

### LEARNING OBJECTIVES

Essential objectives of the course are to learn the classification and taxonomy of the main bacteria, viruses, protozoa and fungi of human interest and diseases related to infections. Furthermore, to address the training development envisaged for a health worker, another objective will be to learn the basic concepts of hygiene and public health, with particular attention to the concepts of health and disease and their determinants, strategies and primary prevention methods and secondary. From a more applicative point of view, the knowledge of the different diagnostic methodologies for such infections will be indispensable. These objectives will be achieved through lectures, seminars and interactive teaching activities, intended to facilitate learning and improve the ability to face and solve the main questions of Microbiology.

## EXPECTED LEARNING RESULTS

The expected learning outcomes are consistent with the general provisions of the Bologna Process and the specific provisions of Directive 2005/36 / EC. They are found within the European Qualifications Framework (Dublin descriptors) as follows:

## LEARNING OUTCOMES

### Knowledge and understanding

At the end of this teaching the student will have to know:

- The specific classes of bacteria, viruses, fungi and protozoa related to human-interest infections and related diseases.
- The criteria for the diagnosis of diseases caused by pathogenic microorganisms
- The main direct indirect diagnostic techniques: microscopy, cultural tests, serological tests, molecular tests.
- The basics of microbiological pharmacology in diagnostics: tests for the evaluation of susceptibility to anti-microbial drugs and the mechanisms of resistance
- definition of health
- definition of disease
- health determinants: individual, behavioral, environmental, social and economic
- definition of prevention: primary, secondary and tertiary prevention
- prevention strategies and methods
- environment and health
- general concepts on the prevention of infectious diseases and vaccinations
- general concepts on the prevention of chronic degenerative diseases and screening
- knowledge and comprehension of the main culture media for the isolation of bacteria, with particular attention to their classification and composition
- knowledge and comprehension of the concept of sterilization in the field of microbiology
- knowledge and comprehension of the concept of antibiogram and the methods of execution in the microbiology laboratory
- knowledge and comprehension of blood culture and its importance for microbiological diagnosis
- knowledge and comprehension of the concept of urine culture and correct processing
- knowledge and comprehension the pre-analytical phase in the microbiology laboratory
- knowledge and comprehension the various colors used in the microbiology laboratory for the identification of bacteria
- knowledge and comprehension agglutination, immunochromatography and serological techniques for the identification of bacteria and human antibodies.
- knowledge and comprehension of traditional and innovative methodologies for the diagnosis of viruses
- knowledge and comprehension of the principles of pcr-ralttime, types of probes used
- knowledge and comprehension of the advantages and disadvantages of diagnostic methodologies in the field of know how to know and understand the wrong analytical data

### Applying knowledge and understanding

At the end of the course the student will be able to:

Use the laboratory knowledge acquired for the autonomous study of aspects related to the field of microbiological diagnostics, to which the student will dedicate himself in the professional activity

### **Communication skills**

At the end of the course, the student should know :

Use scientific terminology, specific in the field of research and identification of bacteria, viruses, fungi and protozoa, in accordance with the various laboratory contexts

### **Making judgements**

At the end of the course, the student should know:

- carry out general assessments of the Microbiology.

## **COURSE SYLLABUS**

### **Module : Microbiologia, batteriologia e virologia**

Special bacteriology

Staphylococci, Streptococci, Pneumococcus and Enterococci. Bacilli and Clostridia. Corinebacteria and Listeria. Enterobacteriaceae. Pseudomonas. Vibrions, Campylobacter and Helicobacter. Hemophiles, Bordetellae and Caterpillars. Yersinia and Pasteurella. Neisseria. Anaerobic microorganisms. Legionellae. Mycobacteria. Spirochaetes. Mycoplasmas. Rickettsia. Chlamydia. Antibacterial vaccinations. Principles of antimicrobial therapy.

Special Virology

Main classes of viruses of medical interest: Adenovirus, Herpesvirus, Poxvirus, Papovavirus, Parvovirus, Hepatitis virus, Picornavirus, Orthomyxovirus, Paramyxovirus, Rhabdovirus, Retrovirus, Reovirus, Togavirus, Flavivirus, Rotavirus. Diagnostics and antiviral therapy

Notes on special mycology

General characteristics of fungi: wall structure. dimorphism. metabolism, pigments, ecology, habitat, tropism, thallus morphology, hyphal growth, asexual blast and thallic reproduction, colony formation, germination, latency, variability, pathogenicity factors, pathogenesis of endogenous and exogenous fungal infections, non-specific and specific defense mechanisms against fungal infections, classification of fungal infections; anti-fungal diagnosis and therapy.

### **Module : parasitology**

General parasitology. Parasitic protozoans of medical interest. Helminths: Trematodes, Cestodes and Nematodes

### **Module: Hygiene and environmental prevention**

Definition of health and disease:

Definition of primary, secondary and tertiary prevention; Health promotion;

The determinants of health and illness, proximal and distal determinants, lifestyles, empowerment, healthy inequalities.

General concepts of control of communicable diseases: outline of methods of transmission, management and control (isolation, quarantine, chemo- and immuno-prophylaxis, sanitization, disinfection and sterilization measures);

Epidemiology and Prevention of chronic degenerative diseases

Environment and Health Report

### **Modulo: Scienze Tecniche di Medicina di laboratorio**

Bacteriology: Culture media: preparation, growth factors, sowing

Sterilization

Biochemical identification of microorganisms susceptibility

Blood culture, urine culture

Other methods: agglutination, precipitation, immunofluorescence, etc.

Virology:

Laboratory medicine: evolution of virological diagnosis techniques.

Real-time PCR: basic principles and technical aspects.

Application of real-time PCR in the virological field.  
Importance of quantitative real-time dosages in the virological field  
Examples of case-reports in the validation of the analytical data

### **COURSE STRUCTURE**

All modules will be structured in 80 hours total lectures: microbiology, bacteriology and virology module (40 hours); parasitology module (10 hours); Hygiene and Environmental Prevention module (10 hours); module of Technical Sciences of Laboratory Medicine (20 hours).

The frontal teaching will be divided into 2, 3 or 4 hours lessons according to the academic calendar. The frontal teaching includes theoretical lessons with interaction and the projection of videos on the topics covered and seminars on specific topics. At the beginning of each lesson there will be a summary of the previous lesson in order to verify the correct understanding on the part of the students.

### **COURSE GRADE DETERMINATION**

The exam of the Integrated Microbiology course consists of an assessment test of "microbiology, bacteriology and virology", a test of "parasitology", a test of "Hygiene and Environmental Prevention" and a test of "Technical Sciences of Medicine of laboratory" whose marks are an integral part of the evaluation of integrated teaching.

For all oral tests, the exam mark, expressed in thirtieths, is established according to the following criteria:

Not suitable: important shortcomings and / or inaccuracy in the knowledge and understanding of the topics; 18: limited analysis and synthesis skills, frequent generalizations.

18-20: Knowledge and understanding of the subjects just enough.

21-23: Knowledge and understanding of discreet topics.

24-26: Good knowledge and understanding of the topics.

27-29: Full knowledge and understanding of the topics.

30-30L: Excellent level of knowledge and understanding of the topics.

The student can take the tests of the individual modules in a single session or in different sessions of the current academic year according to the methods listed below.

### **EVALUATION TEST FOR MICROBIOLOGY, BACTERIOLOGY AND VIROLOGY**

The preparation of the students will be verified with a written exam followed by an oral test. The written test will consist of 30 questions with multiple choice answers, for each correct answer a point will be awarded. The final score of the written test will be given by the sum of the partial scores assigned to each question correctly answered. To access the oral exam, the student must have completed at least a minimum of 15 points. During the oral exam, the examining commission will evaluate the student's ability to apply knowledge and ensure that the skills are adequate to support and solve laboratory diagnosis problems of a microbiological nature. The following will also be assessed: making judgments, communication skills and learning skills as indicated in the Dublin descriptors.

In the evaluation, knowledge and comprehension skills have a weight of 50%, applied knowledge and understanding skills of 20% and independent judgment of 30%

### **EVALUATION TEST FOR PARASITOLOGY**

Verification of students' preparation will take place through an oral interview. Learning, autonomy of judgment and communication skills will be verified. In the evaluation, knowledge and comprehension skills have a weight of 50%, applied knowledge and understanding skills of 20% and independent judgment of 30%

### **EVALUATION TEST OF TECHNICAL SCIENCES OF LABORATORY MEDICINE**

The preparation of the students will be verified with a written exam followed by an oral test. The written test will consist of 30 questions with multiple choice answers, for each correct answer a point will be awarded. The final

score of the written test will be given by the sum of the partial scores assigned to each question correctly answered. To access the oral exam, the student must have completed at least a minimum of 18 points. During the oral exam, the examining commission will evaluate the student's ability to apply knowledge and ensure that the skills are adequate to support and solve laboratory problems related to clinical biochemistry. The following will also be assessed: making judgments, communication skills and learning skills as indicated in the Dublin descriptors. In the evaluation, knowledge and comprehension skills have a weight of 20%, applied knowledge and understanding skills of 50% and judgment autonomy of 30%

#### EVALUATION EVALUATION TEST AND ENVIRONMENTAL PREVENTION

The preparation of the students will be verified by an oral test. During the oral exam, the examining commission will evaluate the knowledge acquired by the student and his ability to apply them in the examination of questions and problems in the hygiene field. The following will also be assessed: making judgments, communication skills and learning skills as indicated in the Dublin descriptors. In the evaluation, knowledge and comprehension skills have a weight of 50%, applied knowledge and understanding skills of 20% and independent judgment of 30%

**The final assessment of the integrated course will be done by weighted mean on the number of CFU of the respective teaching modules**

#### SUPPORT ACTIVITIES

In addition to the teaching activity, the student will be given the opportunity to participate in seminars, research internships, department internships and monographic courses, and any ECM courses pertaining to the topics covered. The topics of the activities are not subject to examination.

#### READING MATERIALS

Didactic material provided during the lessons (lecture notes, presentations, scientific articles)

Text:

The basics of Microbiology

Authors: Richard A. Harvey, Pamela C. Champe Bruce D. Fisher

#### RESPONSIBLE AVAILABILITY

Students are received by appointment by writing to the following address:

Prof. Daniele Armenia

email [daniele.armenia@unicamillus.org](mailto:daniele.armenia@unicamillus.org)