**Degree in Biomedical Laboratory Techniques**

**INTEGRATED TEACHING NAME: MICROBIOLOGICAL DIAGNOSTICS (Bacteriological diagnostics; Virological Diagnostic; Parassitologycal Diagnostic, Micologycal Diagnostic and Diagnostic Laboratory Techniques)**
**SSD : MED/07-VET/06-MED/46**
**CFU: 6**
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MODULE : **Bacteriological diagnostics, Micologycal Diagnostic and Virological Diagnostic**
SSD : MED/07
Numer CFU CFU : 3
Teacher name: Antonino Di Caro EMAIL: antonino.dicaro@unicamillus.org

MODULE: **Parassitologycal Diagnostic**
SSD: VET/06
Numer CFU: 1
Teacher name: Lorenza Putignani EMAIL: lorenza.putignani@unicamillus.org

MODULE : **Microbiological Techniques-Bacteriology**
SSD : Med/46
Numer CFU: 1
Teacher name: Fabbio Marcuccilli EMAIL: fabbio.matrcuccilli@unicamillus.org

MODULE : **Microbiological Techniques- Virology**
SSD : Med/46
Numer CFU: 1
Teacher name: Fabbio.Marcuccilli EMAIL: fabbio.marcuccilli@unicamillus.org

FREQUENCY MODALITY: A MINIMUM of 75% OF ATTENDED LESSONS IS REQUIRED

**Prerequisites**

The program takes place in the first semester of the third year and the course requires knowledge relating to General Microbiology, Special Microbiology, Clinical and Immunology, as well as the

Principles of operation of the most common Analytical Laboratory tools, applied in the microbiological field.

## LEARNING OBJECTIVES

The main educational objective of this course is to provide the student with the basic knowledge of microbiological diagnosis, referring to basic and innovative techniques.This allows the student to acquire an overview of the diagnosis by understanding in which biological matrices the microorganisms must be researched and what precautions to take in order to make accurate laboratory diagnoses in the microbiological field
The student must have acquired skills and learning methods suitable for updating and continually raising his skills both by independently drawing on scientific texts and articles, and by integrating them with the contents of the other teachings and must be able to gradually acquire the ability to attend specialized seminars, conferences, masters, etc.

## LEARNING OUTCOMES

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

Knowledge and understanding
• Know and understand in which biological matrices they must be searched: viruses, protozoa, bacteria, parasites and fungi
• know and understand the main basic laboratory techniques
• Know and understand molecular techniques for microbiological diagnosis
• Know and understand the diagnostic techniques for the research and identification of bacteria
• Know and understand the diagnostic techniques for the research and identification of viruses
• Know and understand the diagnostic techniques for the research and identification of fungi
• Know and understand the diagnostic techniques for the search and identification of parasites
• Know and understand the advantages and disadvantages of laboratory techniques
• Know and understand the correct interpretation of analytical data

Ability to apply knowledge and understanding
At the end of the course the student will be able to independently and competently carry out the various methods learned during the studies and during the practical lessons. He will be able to independently use the various equipment present in the Clinical Microbiology laboratory.
The student must demonstrate knowledge and ability to apply the main investigation methods designed to identify the types of pathogenic microorganisms.
Furthermore, the student must know the methods of the pre-analytical, analytical and post-

analytical phase, for an accurate laboratory diagnosis.

Communication skills
The student must demonstrate that he has learned an appropriate scientific language for the purposes of correct and rigorous communication necessary to carry out his / her clinical-microbiological laboratory and research activities relating to biomedical and biotechnological analyzes.
Autonomy of judgment
At the end of the course the student must be able to:
• Isolate pathogenic bacteria
• Isolate pathogenic parasites
• Identify pathogenic viruses, fungi and parasites
• Knowing how to make direct and indirect diagnosis for microbiological infections
• Correctly interpret the analytical data
• Interpret the software of the final results
• Correctly manage the pre-analytical and post-analytical phase
• Knowing how to discuss and deal with the problems relating to analytical sessions.

These expected learning outcomes are measurable with the final assessment

**COURSE SYLLABUS**

**BACTERIOLOGICAL DIAGNOSTIC, VIROLOGICAL DIAGNOSTIC AND MYCOLOGICAL DIAGNOSTIC**
Bacteria, viruses and fungi of medical interest.

1. Microbiological diagnostics: pathological samples, collection, transport, storage and processing of samples. Bacterial infections, direct microscopic examination and culture. Viral infections, direct examination and culture. Methods of detection of microbial macromolecules. Latex agglutination test. Elisa. Immunofluorescence. Immunohistochemistry. Serological diagnosis of infection: methods for documenting the presence and titre of specific antibodies. Molecular microbiological diagnostics: extraction of nucleic acids, hybridization methods, amplification of the hybridization signal, post-amplification detection. Automation in the clinical microbiology laboratory: automation in serology, identification of bacteria and antibiogram, extraction of nucleic acids and in amplification of nucleic acids.

2. Respiratory tract infections: the main clinical manifestations and the laboratory diagnosis of upper and lower respiratory tract infections.

3. The most common central nervous system infections (meningitis, encephalitis) and their laboratory diagnosis.

4. Infections of the genitourinary system, in relation to the microbes ( bacteria, viruses and fungi) involved and to the various types of laboratory diagnosis. Sexually transmitted diseases (STDs) and urinary tract infections (UTIs).

5. Gastrointestinal tract infections: the main infections of the stomach, intestines and liver in relation to their etiologic agents an laboratory diagnosis.

6. Skin, bone and joint infections: laboratory diagnostic methods.

7. Vascular and cardiac infections, bacteremia, sepsis: main infectious agents and laboratory diagnosis.

8. Opportunistic infections and healthcare-related infections (ICA): definitions, risk factors, routes of transmission, prevention and treatment.

**PARASITOLOGICAL DIAGNOSTIC**

Introduction to the course: Concepts of ecology applied to parasites and zoonoses

General parasitology

Protozoa

Nematodes

Cestodes

Trematodes

Notes on arthropods

Techniques of isolation and direct and indirect characterization of the main parasites of human interest

**DIAGNOSTIC TECHNIQUES OF BACTERIOLOGY AND VIROLOGY**

-Basic concepts in pre-analytical sample in the bacteriology laboratory. Sepsis, urine culture, liquor and infectious enteritis

- Extraction of nucleic acids. Pcr real time. Pcr and-point. Practical application of manual and automatic methods in the field of molecular virology. Description and discussion on the technical validation of the diagnostic reports produced during the practical sessions.

**COURSE STRUCTURE**

The Bacteriological, Virological and Mycology Diagnostics module is structured in 30 hours of frontal teaching, divided into lessons of 2 or 4 hours according to the academic calendar. The lectures include theoretical lessons and supplementary seminars on the topics covered.

The Parasitological Diagnostics module is structured in 10 hours of frontal teaching, divided into 2-hour lessons based on the academic calendar. For each lesson, synthetic slides are displayed, accompanied by a detailed explanation of the subject matter. Specific topics are also explored through the proposal of scientific texts and papers

The diagnostic techniques module of bacteriology
The laboratory techniques module bacteriology part is structured in 10 hours of frontal teaching, divided into lessons of 2/3 hours according to the academic calendar. The frontal teaching includes theoretical frontal lessons and supplementary exercises on the topics covered, in interactive mode with the student. During the lectures the topics contained in the module program will be illustrated and commented on. The explanation will be performed by projecting illustrative images and through visual tools. In order to ensure correct learning between one lesson and another, an oral examination is provided

The Virology Diagnostic Techniques module is structured in 10 hours of frontal teaching, divided into lessons of 2/3 hours according to the academic calendar. The frontal teaching includes theoretical frontal lessons and supplementary exercises on the topics covered, in interactive mode with the student. During the lectures the topics contained in the module program will be illustrated and commented on. The explanation will be performed by projecting illustrative images and through visual tools. In order to ensure correct learning between one lesson and another, an oral examination is provided

## COURSE GRADE DETERMINATION

The integrated teaching exam consists of an oral exam, during which the commission will assess the student's ability to apply the knowledge learned and will ensure that the skills are adequate to solve the problems that arise in the specific disciplinary field and taking I also take into account the objectives of the teaching. The exam can be passed with a grade of 18/30. The student's learning ability, judgment ability and communication skills will be assessed. In the evaluation, knowledge and understanding have a weight of 50%, knowledge and understanding of 20% and autonomy of judgment of 30%

The student can take the exam in a single session in the recovery session (September / January), while the exam can be taken in two separate sessions in the ordinary sessions (February / July)

The assessments can be carried out both in progress and at the end of the integrated course. The methodology will be communicated at the beginning of the lessons together with the bibliography and / or teaching materials necessary for the preparation for the final evaluation.

- Oral exam: It will focus on questions concerning the study programs. It will evaluate the student's ability to have acquired the knowledge related to the contents of the courses and their integrations, and will ascertain the appropriate use of terminology.
- Written test: It will focus on the programmed topics of the courses that make up the integrated course.

The exam will be assessed according to the following criteria:

**Not suitable**: Poor or lacking knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations of the requested contents; inability to use technical language.
**18-20:** Just enough knowledge and understanding of the topics, with obvious imperfections; just sufficient capacity for analysis, synthesis and autonomy of judgment; poor ability to use technical language.
**21-23:** Sufficient knowledge and understanding of the topics; sufficient ability to analyze and synthesize with the ability to reason with logic and coherence the required contents; sufficient ability to use technical language.
**24-26:** Fair knowledge and understanding of the topics; discrete ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.
**27-29:** Good knowledge and understanding of the required contents; good ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.
**30-30L**: Excellent level of knowledge and understanding of the required content with an excellent ability to analyze and synthesize with the ability to argue the required content in a rigorous, innovative and original way; excellent ability to use technical language.

## SUPPORT ACTIVITIES

No support activities are foreseen.

## RECOMMENDED TEXTS AND BIBLIOGRAPHY

-BACTERIOLOGICAL, VIROLOGICAL, MICOLOGYCAL DIAGNOSTICS
Lippincott® Illustrated Reviews: Microbiology (Lippincott Illustrated Reviews Series) Cynthia Nau Cornelissen Ph.D. (Editor), Marcia Metzgar Hobbs PhD (Editor). Series Editor: Harvey RH, Walters Kluwer.

-PARASITOLOGICAL DIAGNOSTIC

Medical Microbiology, Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller

Bibliography and teaching material chosen by the teacher (presentations, scientific articles, handouts).

Students will be provided with slides and teaching material related to the topics covered, as well as scientific publications

Link:
www.who.int
www.cdc.gov
https://ecdc.europa.eu/en/home

-DIAGNOSTIC TECHNIQUES OF VIROLOGY AND BACTERIOLOGY:
Slides and teaching materials relating to the topics covered, as well as scientific publications will be provided to the students

**AVAILABILITY OF TEACHER**

The student reception takes place by appointment by writing or phoning the following contact details:
Teacher Prof. Fabbio Marcuccilli
fabbio.marcuccilli@unicamillus.org
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