



MODULE 7: MICROBIOLOGY, INFECTIOUS DISEASES AND CRITICAL CARE

Code: 43376

Type: Elective

Credits: 6 ECTS

Language: Spanish / English

Module's Coordinator: Juan José González, PhD

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Schedule for mentoring: Fridays from 12 to 1pm

OBJECTIVES

The objectives of this module are:

- a) to introduce the main technologies available for the etiological diagnosis of infectious diseases and the detection of antimicrobial resistance;
- b) to study the most relevant infectious diseases in the immune suppressed patient and learn how to diagnose them;
- c) to know the role of the clinical microbiology laboratory in infectious disease surveillance, alert and response against public health emerging microbial threats; and
- c) to study the most relevant infectious disease pathologies in the critically ill patient

SKILLS

E01. Identify and use the tools, techniques and methodologies of translational clinical research to solve problems in human health.

E01.23. Use new techniques of mass spectrometry and next generation sequencing, being able to extract and interpret the results.

E01.24. Be able to conduct the microbiological diagnosis of different infectious diseases.

E01.25. Understand the importance of synergy between clinical and basic research groups for the successfully treatment of infectious diseases.

E02. Use of modification techniques in living organisms (or part of them) to improve pharmaceutical and biotech processes or to develop new products.

E02.7. Study experimental animal models in infectious diseases and critical pathology.

E02.8. Develop new pharmacological and non pharmacological therapeutic strategies for the treatment of infectious diseases and critical pathology.

E03. Analyze the pathophysiology at the molecular level using the scientific method and identify its relationship with the clinical process of different diseases.

E03.9. Know the basis and physiopathological disturbances involved in infectious diseases and critical pathologies.

E03.10. Study and characterization of infectious diseases biomarkers. Learn different techniques and new approaches for biomarkers analysis.

CONTENT

SECTION I: MICROBIOLOGY AND INFECTIOUS DISEASES

Lesson 1. Antimicrobial agents

Antimicrobial drugs; Mechanisms of action

Lesson 2. Resistance to antimicrobials

Mechanisms of antimicrobial resistance, Methods for the study of bacterial resistance; Multidrug resistance in the hospital setting; Multidrug resistance surveillance and Healthcare-associated infections

Lesson 3. Microbiological Surveillance of Infectious Diseases (Part I)

General concepts; Microbial typing, Next generation sequencing and infectious diseases surveillance.

Lesson 4. Microbiological Surveillance of Infectious Diseases (Part II)

Whooping cough, Invasive meningococcal disease

Lesson 5. Microbiological Surveillance of Infectious Diseases (Part III)

Emerging viral pathogens I: influenza and enteroviruses

Lesson 6. Microbiological Surveillance of Infectious Diseases (Part IV)

Emerging viral pathogens II: coronaviruses

Lesson 7. Imported infectious diseases

Arboviral infections; Chagas disease.

Lesson 8. HIV Pathogenesis and treatment

General concepts; viral reservoirs; new antiviral targets

Lesson 9. Microbiological diagnosis in Immunosupressed patients

Solid organ transplant and haematological patients.

Lesson 10. Sepsis and Septic Shock

- Sepsis pathophysiology and therapeutic targets.
- Biomarkers in sepsis: main role in early diagnosis, prognostication and decision making.
- Septic shock: from physiology to bedside monitoring and hemodynamic support.
- Organ cross-talk and multiorgan dysfunction: ARDS, AKI and others.

Lesson 11. Sepsis Code

- Sepsis code: Fast-track sepsis management
- Quality improvement interventions in sepsis and severe infections
- Optimal workflow in the microbiology lab for time-dependent infections.
- Personalized medicine in sepsis

Lesson 12. Immunosensors as point-of-care (POC) diagnostic tools

- A technical look to the basics. Aptamers, phages and mimetic polymers. Requirements of POC testing. Biosensors for infectious disease POC testing.

A close look to a Clinical Microbiology Laboratory.

METHODOLOGY

Theoretical classes

Solving problems / case study

Making reports/works

Autonomous study

Reading articles/reports of scientific interest

Presentation/ oral defense of works

Tutorials

EVALUATION

Theoretical exam	50%
Oral presentation	40%
Attendance and participation in class	10%

Attending a minimum of 80% of the classes is required for taking the exam and passing the course.

In order to pass the course, a minimum of 4 out of 10 points will be required in the final exam.

To participate in the recovery process, students must have obtained a minimum of 3.5 points in the evaluation of the module.

The professor responsible of the module, with the approval of the master's coordination and the center, may exclude from the recovery process those activities that, due to their nature, consider that they cannot be recovered, as long as and when they do not exceed together 50% of the final qualification of the course.

The recovery test will consist of an oral exam within a maximum period of 15 days after the publication of the evaluation of the course.

TEACHING STAFF

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ACADEMIC SCHEDULE

Timetable: From November 21st 2024 to December 19th 2024.

Oral presentation: 20th January 2025, From 9 to 1 pm

Exam date: 22nd January 2025, from 9 to 12 a.m.

[See the Master's Degree Schedule for academic year 2024-2025](#)

Classroom:

Please, check the information board at the Academic Office of the Teaching Pavilion in order to confirm the classroom before the class starts.