



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

✉ jjgonzal@vhebron.net

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. Introduction to Clinical Microbiology and Infectious Diseases.

Introduction, Infectious syndromes, Diagnosis of infectious diseases, Molecular typing

Lesson 2. Antimicrobial agents and resistance to antimicrobials

Antimicrobial drugs; Mechanisms of action and 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, Sexually transmitted diseases

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; tuberculosis; Chagas disease.

Lesson 8. Immune suppressed patients

Solid organ transplant and haematological patients.

Lesson 9. HIV Pathogenesis and treatment

General concepts; viral reservoirs; new antiviral targets

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.

TEACHING STAFF

Juan José González, MSc PhD jjgonzal@vhebron.net

Ricard Ferrer, MD PhD r.ferrer@vhebron.net

ACADEMIC SCHEDULE

Timetable: From November 29th to December 22nd 2021.

Exam date: 21st January 2022, from 9 to 12 a.m.

[See the Master's Degree Schedule for academic year 2021-2022](#)

Classroom:

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