COURSE DATA

DATA SUBJECT

Code: 34328
Name: Microbiology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1208 - Degree in Podiatry	Facultat d'Infermeria i Podologia	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1208 - Degree in Podiatry	Microbiology	BASIC

COORDINATION

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SUMMARY

Microbiology is a basic training subject, which due to its content is considered essential for the understanding of podiatric infectious pathology. It is linked to the specific subjects of General Podiatry, Podiatric Pathology and Podiatric Surgery.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

A solid knowledge of Biology at the high school level is considered necessary.
No enrollment restrictions have been specified regarding other subjects in the curriculum.

COMPETENCES / LEARNING OUTCOMES

1208 - Degree in Podiatry

Know the basic concepts of microbiology. Morphology and physiology of microorganisms. Infection. Immunology. Natural and acquired immunity. Vaccines and serums. Most frequent microorganisms in foot pathologies. Fundamental aspects of health parasitology. Environmental microbiology. Laboratory and microbiological diagnosis of diseases. Mechanisms of viral pathogenicity. Mycology. Microbiological foundations for the prevention of infection.

DESCRIPTION OF CONTENTS

1. Introduction to Medical Microbiology

Introduction to Medical Microbiology. Historical development. Differences between prokaryotic and eukaryotic cell organization. Kingdoms of Nature and the placement of human pathogens. Concepts of Microbiology and Parasitology.

2. Pathogenesis of Infectious Diseases

Pathogenesis of infectious diseases. Types of relationships. Normal human flora. Colonization vs. infection. Infectious disease. Koch's postulates. Pathogenicity and virulence. Factors responsible for pathogenicity.

3. Introduction to the Immune System

Introduction to the study of the immune system. Immune response: involved molecules, cells, and organs. Humoral and cellular immune responses. Concept of antigen and immunogen. Types of antigens. Haptens. Antigen recognition by T and B cells and the antigen-antibody reaction.

4. Immunoglobulins

Structure and types of immunoglobulins. Constant and variable regions. Biological functions. Concepts of allotype and idiotype. T-B cell cooperation in antibody production.

5. Complement System

Concept, biological functions, activation, and regulation mechanisms. Interleukins (cytokines): concept and biological functions. Major Histocompatibility Complex (MHC): physiological and diagnostic importance. Immune response regulation: by antibodies, idiotypic regulation, cellular regulation. Cytotoxicity mechanisms.

6. Immunology of Infections

Immunological aspects of viral, bacterial, fungal, and parasitic infections. Effector mechanisms and parasite survival strategies.

7. Bacterial Morphology and Structure

External, surface, and internal bacterial structures: capsule, flagella, pili, cell wall, cytoplasmic membrane, ribosomes, inclusions, nucleoid, and spores. Differences between Gram-positive and Gram-negative cell walls.

8. Bacterial Metabolism

Bacterial division (cellular and population level). Trophic types. Respiratory and fermentative metabolism. Bacterial culture. Bacterial genetics: plasmids and transposons. Genotypic variations: mutations, genetic exchange (transformation, conjugation, transduction).

9. Methods for Studying Infections

Direct microbiological diagnosis. Antibody detection methods and their clinical microbiology applications.

10. Control and Destruction of Microorganisms

Methods for microbial control and elimination.

11. Gram-Positive Cocci

Study of the genera *Staphylococcus*, *Streptococcus*, and *Enterococcus*. Classification, pathogenic factors, clinical syndromes, and microbiological diagnosis.

12. Aerobic Gram-Positive Bacilli

Identification methods and biochemical testing. In vitro antimicrobial susceptibility testing.

13. Enteric and Other Gram-Negative Bacilli

Study of Enterobacteriaceae, *Vibrio*, *Pseudomonas*, *Burkholderia*, *Stenotrophomonas*, and *Acinetobacter*.

14. Study of the Order Actinomycetales

Mycobacterium (*M. tuberculosis*, *M. leprae*), *Nocardia*, and other clinically relevant actinomycetes.

15. General Virology and Virus Structure

Virus structure and classification. Replication models. Viral pathogenesis. Virus culture. Viroids and prions. Antivirals: mechanisms of action.

16. DNA Viruses ¿ Papillomaviridae

Overview of DNA viruses. Focus on *Papillomavirus*: oncogenes and viral oncogenesis mechanisms.

17. RNA Viruses ¿ Riboviruses Causing Skin Lesions

Overview of RNA viruses. Focus on riboviruses responsible for skin lesions.

18. Retroviridae Family ¿ HIV

Lentivirus genus: Human Immunodeficiency Virus (HIV). Human retroviruses HTLV I and II.

19. Hepatitis Viruses

Study of hepatitis viruses: *Hepatovirus* (A), *Hepevirus* (E), *Hepacivirus* (C), *Orthohepadnavirus* (B), and *Deltavirus*(Delta).

20. Morphology and Physiology of Metazoan and Protozoan Pathogens Relevant to Podiatry

Classification, pathogenesis of protozoan and helminth infections. Mechanisms of action of antiprotozoals and anthelmintics.

21. Fungal Morphology and Structure

Classification, asexual and sexual reproduction. Pathogenesis of mycoses. Diagnostic methods. Antifungals: mechanisms of action.

22. Superficial, Cutaneous, and Subcutaneous Mycoses

Study of *Pityriasis versicolor*, dermatophytoses, sporotrichosis, chromoblastomycosis. Special focus on eumycetoma.

23. Opportunistic Mycoses

Study of infections by *Candida*, *Aspergillus*, *Mucor*, *Cryptococcus*, and *Pneumocystis jiroveci*. Systemic dimorphic fungal infections.

24. Microbiology of Skin and Soft Tissue Infections

Microbial ecology of the skin and foot. Microbiology of superficial and subcutaneous infections. Foot ulcers. Onychomycosis and perionychomycosis: clinical, epidemiological, and etiological features.

25. Clinical and Microbiological Features of Musculoskeletal and Osteoarticular Infections

Clinical-epidemiological characteristics and microbiological diagnosis of musculoskeletal infections (fasciitis, myositis) and osteoarticular infections (septic arthritis, osteomyelitis).

26. Systemic Infections and Their Significance

Main systemic infections in immunocompromised patients and other high-risk groups.

27. Special Study: Diabetic Foot

Definition, pathophysiology, stages of infection, etiology, and approach to microbiological diagnosis.

28. Seminar 1 ¿ Rational Use of Antimicrobials

Clinical implications, in vitro and in vivo evaluation tests. Antimicrobial susceptibility profiles.

29. Seminar 2 ¿ Basis of Antimicrobial Resistance

Clinical relevance of microbial resistance. Genetic foundations. Resistance mechanisms: enzymatic inactivation, permeability changes, efflux pumps, target alteration. Resistance control.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	48,00
Laboratory	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	90,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

For **theoretical classroom sessions**, lectures are delivered using audiovisual support (PowerPoint and video) to present fundamental concepts and to pose questions that encourage student participation in each topic. Students can access the materials in advance through the Virtual Classroom platform.

For **practical laboratory work**, students are provided with a guide outlining the tasks to be performed, along with the necessary materials. In the provided guide, students must record their observations, comments, and results, which will form the basis of their evaluation dossier. The scheduling of these practical sessions during the final weeks of the semester allows students to apply the theoretical knowledge acquired earlier.

Tutorial support, when requested by students, will be arranged with the faculty members responsible for each topic. The use of the Virtual Classroom is recommended for specific queries. Additionally, group tutorials are offered to help prepare for exams and address general interest questions.

EVALUATION

To assess the achievement of learning outcomes, the following will be considered:

a) The **theoretical part** is evaluated through multiple-choice questions (with a correction factor for guessing: 1 point deducted for every 4 incorrect answers). This section accounts for **70%** of the final grade. The content covered in the seminars is included in this assessment. Please note that **attendance at both seminars is mandatory**.

b) The **practical part** is evaluated through multiple-choice questions related to the tasks carried out during the various laboratory sessions. This section represents **30%** of the final grade. Attendance at practical sessions is **mandatory**, and therefore, it is a necessary condition to be eligible for evaluation in the course. For students repeating the course, prior attendance at practical sessions and the grade obtained in the practical component from the previous year will be retained.

If either part (theory or practical) is **not passed**, the transcript will show a **FAIL**, with the grade corresponding to the failed component.

In the second exam session, students will be required to pass the practical part through a multiple-choice exam, similar to the first session.

REFERENCES

- 1. De La Rosa M. (2011). Microbiología. Enfermería. Ciencias de la Salud. Conceptos y Aplicaciones. Elsevier. 3ª edición. 2. Murray PR, Rosenthal KS y Pfaller MI. (2021). Microbiología médica. Ed. Elsevier Mosby. 9ª edición. 3. Tortota GJ, Funke BR y Caso CL. (2007). Introducción a la Microbiología. Ed. Panamericana. 9ª edición.

- 1. Regueiro JR, López C, González S, Martínez E. (2011). Inmunología. Biología y patología del sistema inmunitario. Ed. Médica Panamericana. 4ª edición revisada. 2. Delves P, Martin S, Burton D, Roitt I. (2014). Roitt-Inmunología. Fundamentos Ed. Médica Panamericana. 12ª edición. (eBook on line).