



UCAM
UNIVERSIDAD
CATÓLICA DE MURCIA

Course Guide 2018/2019

Microbiology

Microbiología

Bachelor in Dentistry

Mode: On Campus

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Microbiology

Module: **Biomedical Sciences.**

Subject: **Microbiology.**

Level: **Basic.**

No. of Credits: **6 ECTS.**

Academic Session: **1st Course – 1st Semester.**

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Professor coordinating the Module: **Sonia Sánchez Bautista.**

Brief Description

Microbiology is a fundamental subject that studies microorganisms as infectious agents of the human being, including how to make a diagnosis, the mechanisms that act as the individual's own defenses, the epidemiology, pathogenesis, treatment, and prevention against infection. Oral Microbiology is specifically aimed at the study of the microbiota of the oral cavity and the role it plays in health and diseases that occur in that environment, dental caries, periodontitis etc., and its impact on systemic diseases.

Prerequisites

None.

Objectives

1. To know the characteristics of the main microorganisms, bacteria, viruses, fungi, and parasites related to human infections that are found mainly in the oral cavity.
2. To know the mechanics of the pathogenesis of infectious agents.
3. To know the defense mechanisms against microorganisms and their response.
4. To know the relationship of each pathogen with its clinical response.
5. To know the normal microbiota of the oral cavity, to understand the implications it has on oral and dental health, and especially on the etiology of the infectious diseases of its environment.
6. To know the principles of microbiological diagnosis, to interpret them correctly, and to know how to use them optimally for the best use of resources. To share information obtained in a way that is easy to understand.

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7. To know how to correctly take samples for microbiological diagnosis, its transport, and conservation until it is processed.
8. To know the mechanisms of action, resistance, and the spectrum of antimicrobials as well as their rational application in patients.
9. To develop the necessary practical skills for laboratory work: biosecurity, sterility, disinfection, antisepsis, microscopic observation, handling of material and equipment for cultivation, serological and molecular techniques, etc.

Competencies and Learning Outcomes

Basic competencies

MECES1: Students have demonstrated that they possess and understand the knowledge in an area of study that starts from the basis of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the forefront of their field of study.

MECES2: Students know how to apply their knowledge to their work or vocation in a professional manner and they possess the skills that are usually demonstrated through the elaboration and defense of arguments and through problem-solving within their area of study.

MECES3: Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant issues of a social, scientific, or ethical nature.

MECES4: Students can transmit information, ideas, problems, and solutions to a specialized and non-specialized public.

MECES5: Students have developed the learning skills necessary to undertake later studies with a high degree of autonomy.

General competencies

G11: To understand the basic biomedical sciences on which Dentistry is based to ensure correct oral and dental care.

G12: To understand and recognize the structure and normal function of the stomatognathic apparatus at the molecular, cellular, tissue, and organ levels in the different stages of life.

Interdisciplinary competencies

CT3: The ability to work as a team and to interact with other people in the same or different professional field.

Specific competencies

CBM1: To understand the biomedical sciences on which Dentistry is based to ensure correct oral and dental care. Among these, appropriate subject matter should include:

- Embryology, anatomy, histology and physiology of the human body.
- Genetics, biochemistry, molecular and cellular biology.

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- Microbiology and immunology.

CBM2: To know the morphology and function of the stomatognathic apparatus, including specific appropriate subject matters of embryology, anatomy, histology, and physiology.

Methodology

Methodology	Hours	Hours of Classroom Work	Hours of Non-Classroom Work
Classroom based Classes	30	60 hours (40 %)	
Academic Tutorials	6		
Practicums	15		
Seminars	6		
Classroom Evaluations	3		
Personal Study	63	90 hours (60 %)	
On-line Tutorials	9		
Resolution of Exercises and Practical Cases	9		
Project Completion and Oral Presentations	9		
TOTAL	150	60	90

Syllabus

Theoretical instructional program

1. Introduction to Microbiology. Microbiology and microorganisms. Cellular organization and general classification of microorganisms. Oral microbiology.
2. Methods and techniques in Microbiology.
3. Morphology and structure of prokaryotes (I).
4. Morphology and structure of prokaryotes (II).
5. General metabolism of prokaryotes.
6. General aspects of prokaryotic genetics.
7. Taxonomy of prokaryotes.
8. General characteristics of viruses.
9. General characteristics of fungi.
10. General characteristics of parasites.
11. Infections and infectious diseases.
12. General aspects of defenses against infection.
13. Sterilization and asepsis. Practical asepsis in dentistry.

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14. Antibiotics and antimicrobials. Overview of the use of antimicrobials in dentistry.
15. Bacteria of dental interest (I): gram-positive cocci.
16. Bacteria of dental interest (II): gram-positive bacilli.
17. Bacteria of dental interest (III): cocci, coccobacilli and gram-negative bacilli.
18. Bacteria of dental interest (IV): strict anaerobic gram-negative bacilli.
19. Bacteria of dental interest (V): gram-negative spirillum and spirochetes.
20. Other bacteria of interest.
21. Hepatitis virus.
22. Human immunodeficiency virus.
23. Other viruses of interest. Herpes simplex virus. Respiratory viruses. Oncogenic viruses.
24. Fungi and protozoa of dental interest.
25. Ecology of the oral microbiota (I): the mouth as a bacterial ecosystem.
26. Ecology of the oral microbiota (II): factors that determine the composition of oral microbiota.
27. Dental plaque. Microbiological study.
28. Cavities. Microbiological aspects.
29. Periodontal infectious disease.
30. Infectious endodontic disease and other infections of dental interest.

Practical instructional program

The practicums will be held at the laboratories of the UCAM and are aimed at familiarizing the student with the management of microorganisms and the diagnostic tests of infectious diseases, especially those related to the oral cavity.

Duration 15 hours.

Practicum 1

- The Microbiology Laboratory: design, safety, waste, reagents, and instruments.
- Characteristics and diagnosis of bacteria.
- Description of the different diagnostic techniques.
- The microscope. Stains.

Practicum 2

- Means of cultivation: ways of sowing.
- Sampling of the oral cavity.
- Cultivation of bacteria from the oral cavity and typical pathogens.
- Fresh preparations. Yeast and fungi observation.

Practicum 3

- Reading and interpreting culture plates.
- Stains from colonies.
- Bacterial identification, doing fast and traditional tests.
- Other forms of identification.

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Practicum 4

- Interpretation of identification tests.
- Susceptibility tests: foundation and methodology.
- Performing antibiograms.

Practicum 5

- Reading and interpreting antibiograms.
- Diagnostic techniques based on Antigen-Antibody reactions.
- Molecular biology techniques: description and interpretation.

Relationship to Other Courses of the Study Plan

Microbiology is related to other basic subjects of the Bachelor in Dentistry such as Biology and Biochemistry, and is especially inseparable from Infectious Pathology, providing knowledge on the bases of diagnosis, pathogenesis, and therapeutics.

Grading System

For the February/September Sessions:

- 1. Theoretical exams (70%):** Exams (or evaluative tests) will be carried out with theoretical-practical questions and resolution of assumptions that include the contents of the material studied.
- 2. Practical exams (30%):** The practicums and/or seminars will be evaluated through different grading systems (practical exercises, completion and exhibition of projects, clinical cases, etc...) that include the practical content worked on.
- 3. Academic tutorials:** The student's participation will be evaluated through different means such as forums, chats, videoconferences, self-evaluations, activities proposed by the professor, and/or debates.

The student shall pass the subject when the weighted average is equal to or greater than 5 points and all the parts that make up the grading system have been passed, with an overall weight equal to or greater than 20%.

If the student has less than 5 in any of the parts with a weight equal to or greater than 20%, the subject will be suspended, and the student must retake the part(s) in the next session within the same academic year. The suspended part(s) in official sessions (February/June) will be saved for successive sessions that are held in the same academic year.

In the event that the subject is not passed in the September session, the passed parts will not count for successive academic years.

The grading system (RD 1.125/2003. of September 5) shall be the following:

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0-4.9 Suspended (SS)

5.0-6.9 Passed (AP)

7.0-8.9 Excellent (NT)

9.0-10 Outstanding (SB)

Honorable mention may be granted to students who have earned a grade equal to or greater than 9.0. This number may not exceed 5% of the total number of students enrolled in a subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case only a single honorable mention may be granted.

Bibliography and Reference Sources

Basic Bibliography

- Liébana Ureña, J. (2002) Microbiología Oral. 2ª ed. [*Oral Microbiology. 2nd Edition.*] McGraw-Hill. Interamericana.
- Lamont, R. J., Hajishengallis, G. N., Jenkinson, H.F. (2014) Oral Microbiology and Immunology. Washington: 2ª ed ASM, American Society for Microbiology.
- Negroni, M. (2009) Microbiología Estomatológica. Fundamentos y guía práctica. 2ª ed. [*Stomatological Microbiology. Foundations and Practical Guide. 2nd Edition.*] Panamericana.
- Valero, P.L. (2015) Bacterias de interés odontológico, 1ª ed. [*Dental bacteria of interest. 1st Edition.*] Edit.um, Universidad de Murcia.
- Murray, P.R., Rosenthal, K.S., Tenover, M.A. (2013) Microbiología Médica, 7ª ed. [*Medical Microbiology. 7th Edition.*] Elsevier.
- Prats, G. (2013). Microbiología Médica y Parasitología. 1ª ed. [*Medical Microbiology and Parasitology. 1st Edition.*] Panamericana.

Additional Bibliography

- Rémic. (2015) Référentiel en Microbiologie Médicale. 5ª ed. Société Française de Microbiologie.
- Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton. (2009) Microbiología [de] Prescott, Harley y Klein. 7ª ed. [*Prescott, Harley, and Klein Microbiology. 7th Edition.*] McGraw-Hill, Madrid.
- Prescott, L.M., Harley, J.P. y Klein, D.A. (2009). Microbiología. 7ª ed. [*Microbiology. 7th Edition.*] McGraw-Hill. Madrid.
- Prats G. Microbiología clínica. [*Clinical Microbiology.*] (2006) Editorial Médica Panamericana.

Related Websites

- Catalog of prokaryotes. <http://www.bacterio.net>
- Spanish network of Oral Microbiology. <http://remoraspain.blogspot.nl>
- SEIMC. www.seimc.org
- ASM. www.asm.org
- Instituto de Salud Carlos III. [*Carlos III Health Institute.*] http://www.isciii.es/htdocs/centros/epidemiologia/epi_sim.jsp
- CDC. Center for Disease Control and Prevention (USA). <http://www.cdc.gov/spanish>
- Harrison Medicine. Infectious Diseases. <http://www.harrisonmedicina.com/recursos/resourcetoc.aspx?resourceid=106>
- Sociedad Española de Microbiología SEM. [*Spanish Society of Microbiology.*] <http://www.semicrobiologia.org/Microbiología>
- SEM Group of Teaching and Dissemination of Microbiology. <http://www.semicrobiologia.org/ddm/index.php>
- WHO <http://www.who.int/es>

Study Recommendations

It is recommended to study the subject on a daily, continuous, and orderly basis, in order to keep up with the classes and seminars.

Teaching Materials

A lab coat is required for practicums in the laboratory and in the rotations through the Pathological Anatomy Department of the teaching hospital. Access keys to the computer program “Civagenius” that allow for observation of histological preparations of these lesions which are previously scanned from a computer or tablet as if it were a microscope.

Tutorials

Brief Description

In academic tutorials, the focus will be to work on Decree No. 359/2009, of October 30th, which establishes and regulates the educational response to the diversity of students in the Autonomous Community of the Region of Murcia.

The activities that are carried out in the Academic Tutorials on this subject are:

- Personal orientation on the contents of the subject and the grading systems.
- Consolidation of knowledge, abilities, skills and attitudes of group work, and oral and written communication.
- Planning and promoting student learning through the provision of bibliographic and documentary sources.
- Advice on how to approach the activities of the practical seminars.

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The University also has a Special Body of Tutors that conducts personal tutoring with students enrolled in the degree. The personal tutor accompanies the students throughout the university phase. You can check the following link:

<http://www.ucam.edu/servicios/tutorias/preguntas-frecuentes/que-es-tutoria>