

Medical Microbiology

Code: 101928
ECTS Credits: 6

Degree	Type	Year	Semester
2501230 Biomedical Sciences	OB	3	1

Errata

There has been a change in the teacher responsible for this subject. The new responsible is Dr. Carme Muñoz Batet (CMunoz@santpau.cat).

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

General knowledge of cellular and molecular biology, anatomy, physiology and microscopic structure of human apparatus and systems.

Objectives and Contextualisation

General

To give the student a general knowledge about the microorganisms responsible for human infectious diseases and the basic concepts of physiopathology, diagnosis and prophylaxis from an etiological perspective. To enable him/her to understand the advantages and disadvantages, and ultimately to guide and interpret the different diagnostic techniques of infectious diseases.

Objectives of the theoretical classes

To provide specific knowledge on the general characteristics of microorganisms, their pathogenicity mechanisms and host defence mechanisms. Familiarize the student with microbiological diagnostic techniques and the general principles of treatment and prevention of infectious diseases. Systematically review the main bacteria, fungi, viruses and parasites responsible for infections.

Objectives of the practices

The general objective of the internship is to give the student a broad view of current microbiological diagnostic techniques, their value and limitations. First, it is necessary for the student to personally perform and know the nature of the different techniques of direct diagnosis (microscopic examination, culture isolation, detection of antigens and specific nucleotide sequences) and indirect diagnosis (serology). Then, in a second phase, he must know the possibilities of their application in the diagnosis of infectious diseases, their advantages and disadvantages.

Competences

- Contribute to public discussions on cultural matters.
- Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
- Develop independent learning habits and motivation to continue training at postgraduate level.
- Develop independent learning strategies.
- Develop scientific knowledge, critical reasoning and creativity.
- Display knowledge of the bases and elements applicable to the development and validation of diagnostic and therapeutic techniques.
- Display knowledge of the basic life processes on several levels of organisation: molecular, cellular, tissues, organs, individual and populations.
- Display knowledge of the concepts and language of biomedical sciences in order to follow biomedical literature correctly.
- Display theoretical and practical knowledge of the major molecular and cellular bases of human and animal pathologies.
- Generate innovative and competitive proposals for research and professional activities.
- Identify and understand the advances and challenges of research.
- Respect diversity in ideas, people and situations.
- Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Learning Outcomes

1. Contribute to public discussions on cultural matters.
2. Describe the most important groups of pathogenic microorganisms .
3. Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
4. Develop independent learning habits and motivation to continue training at postgraduate level.
5. Develop independent learning strategies.
6. Develop scientific knowledge, critical reasoning and creativity.
7. Explain the relationships between a possible pathogen and its host.
8. Generate innovative and competitive proposals for research and professional activities.
9. Identify and understand the advances and challenges of research.
10. Identify the techniques used in the detection and identification of pathogens.
11. Recognise the role of microorganisms as agents of disease or toxicological problems in human beings, animals and plants.
12. Respect diversity in ideas, people and situations.
13. Understand the concepts and language of microbiology and consult the scientific literature in the area of microbiology.
14. Work as part of a group with members of other professions, understanding their viewpoint and establishing a constructive collaboration.

Content

Theoretical program:

Introduction to Medical Microbiology and Parasitology. Groups of living beings with pathogenic capacity for man. Native flora of man.

Infectious diseases. Reservoir and transmission of pathogenic microorganisms. Pathogenesis of infections. Epidemiology. Diagnosis and treatment.

Host-parasite relations. Mechanisms of microbial pathogenicity and defence mechanisms.

General characteristics of bacteria.

General characteristics of fungi.

General characteristics of viruses.

General characteristics of protozoa and helminths.

Microbiological diagnosis of infectious diseases.

Antibacterial and antifungal drugs. Mechanisms of resistance.
Antiviral drugs. Classification. Mechanism of action.
Staphylococci. General characteristics. Pathogenic action. Staphylococcus aureus. Pathogenic action.
Epidemiology. Treatment. Inactivated enzymes of penicillins. Other staphylococci with pathogenic capacity for man.
Streptococci and enterococci. Classification. Microbiological characteristics. Streptococcus pyogenes. S. agalactiae. Streptococci of the viridans group. S. pneumoniae. Genus Enterococcus.
Neisseria. Bacteriological characteristics. Habitat. Pathology. Diagnosis. Treatment.
Enterobacteria. Definition. Habitat. Primary and opportunistic pathogenic enterobacteria.
Pseudomonas and other non-fermenting gram-negative bacilli. Genus Acinetobacter.

Spirochetes. Main genera Treponema, Borrelia and Leptospira. Microbiological characteristics. Habitat. Pathology. Diagnosis. Treatment.
Mycoplasmas, chlamydia and rickettsia. Bacteria of forced intracellular life. Bacteriological characteristics. Habitat. Pathology. Diagnosis. Treatment.
Agents causing cutaneous and subcutaneous mycosis. Dermatophytes. Sporothrix shenckii. Mycetoma agents. Chromoblastomycosis agents.
Primary pathogenic fungi and opportunistic yeasts causing systemic mycosis. Genera Candida and Cryptococcus. Appendix: Pneumocystis jiroveci.
Systemic opportunistic infections. Upper filamentous fungi hyalinos Aspergillus, Scedosporium and others. Pathology and diagnosis. Lower filamentous fungi: zygomycetes. Pathology and diagnosis.
Surrounding DNA virus. Herpesvirus. Classification. Biological characteristics. Pathology. Other DNA viruses with surrounds.
Virus DNA without surrounds. Adenovirus and papillomaviruses. Biological characteristics. Pathology. Papilloma and cancer. Parvovirus and other naked DNA viruses.
RNA virus without surrounds. Picornavirus. REOVIRUS (Rotavirus). Calicivirus (Norovirus). Classification. Biological characteristics. Pathology. Diagnosis and treatment. Other RNA viruses without surrounds.
RNA virus with surrounds. Ortomixovirus and paramixovirus and other respiratory viruses. Classification. Biological characteristics. Pathology. Diagnosis and treatment. Other RNA viruses with surrounds.
Hepatitis virus. Classes of biological characteristics. Epidemiology: geographical distribution, transmission. Clinical. Persistence. Chronic hepatitis: cirrhosis and cancer. Diagnosis. Treatment: antivirus, interferons.
Retrovirus. Classification. Replication. AIDS virus. Biological characteristics. Pathology. Diagnosis. Treatment. Other retroviruses of interest. Retroviruses and cancer.
Vaginal and intestinal protozoosis. Entamoeba histolytica. Trichomonas and Giardia. Microbiological characteristics. Habitat. Pathology. Diagnosis. Treatment. Schistosomes. Biological characteristics. Geographical distribution. Life cycles. Pathology. Diagnosis. Treatment.
Systemic Protozoosis. Plasmodium. Classification. Biological characteristics. Transmission and life cycle. Geographical distribution. Diagnosis. Prophylaxis and treatment. Leishmania. Biological characteristics. Geographical distribution. Life cycle. Pathology. Diagnosis and treatment.

Parasites. Systemic Protozoosis. Trypanosoma. Biological characteristics. Geographical distribution. Life cycle. Pathology. Diagnosis and treatment. Toxoplasma. Biological characteristics. Transmission and life cycle. Diagnosis and treatment.
Platelmintos of interest in medicine. Tenías. Biological characteristics, life cycles. Pathology. Diagnosis. Treatment. Platelmintos of restricted distribution. Nematodes. Pinworms and tartars. Biological characteristics, life cycles. Pathology. Diagnosis. Treatment.
Nematodes of restricted distribution: hookworm. Necator. Strongyloids. Filarias. Biological characteristics, life cycles. Pathology. Diagnosis. Treatment.

LABORATORY PRACTICES

Total hours: 13 hours

agenda:

Microscopy: Observation of fresh samples. Staining.
Clinical sample. Culture, type of culture media, incubation atmosphere, temperature and time.

Bacterial identification methods and antimicrobial sensitivity tests. Interpreted antibiogram concept. Antigen detection techniques. Diagnosis based on antigen detection. Ge techniques

Methodology

The teaching methodology will consist of theoretical classes, classroom practices and laboratory practices.

Theoretical classes will be given in the form of master classes. Classroom practices and laboratory practices will be carried out in groups of 20 students.

In the laboratory practices the students will develop different techniques to familiarize with the working methods of the laboratory of Microbiology used for the etiological diagnosis of infectious diseases.

In the classroom practices the basic principles of etiological diagnosis of infectious diseases will be reviewed and discussed with the students.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Masterclasses	36	1.44	1, 6, 5, 4, 3, 8, 9, 12, 14
Practicum and seminars	23	0.92	1, 6, 5, 4, 3, 8, 9, 12, 14
Type: Autonomous			
Autostudy	87	3.48	

Assessment

The internships and seminars are compulsory attendance and are essential to be able to be evaluated of the subject.

The note of the practical examination will include the evaluation of laboratory practices and seminars. This exam will consist of short questions.

The theoretical examination will consist of short questions (100%).

There is the possibility of freeing up material by means of 2 partial theory evaluations. A grade of 6 or higher is required to pass these exams.

The practical examination will take place at the time of the second partial evaluation of the subject.

Pupils with subject not released by partials may take a final make-up exam.

The final grade will be obtained by combining the theoretical grade (70%) and the practical grade (30%).

In order to pass the course it will be necessary to obtain an overall grade equal to or higher than 5 out of 10.

Students who have completed less than 50% of the course activities will be given the grade of "not evaluable".

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Practical examination	30%	2	0.08	8, 10, 12, 14
Theoretical examination	70%	2	0.08	13, 1, 2, 6, 5, 4, 3, 7, 8, 9, 11, 12, 14

Bibliography

Specific Bibliography

Prats G. Medical Microbiology and Parasitology. Madrid. Ed. Médica Panamericana. 2012.
Murray PR., Rosenthal KS., Pfaller MA. Medical Microbiology. 7th Ed. Philadelphia. Elsevier. 2013.
Prats G. Clinical Microbiology. Madrid. Ed. Médica Panamericana. 2005

Reference Bibliography

Mandell GL, Bennet JE, Dolin R. Mandell, Douglas and Bennet 's - Principles and Practice of Infectious Diseases. 6th Ed Philadelphia: Elsevier Churchill Livingstone, 2009.
Ausina V., Moreno Guillén S. SEIMC Treaty on Infectious Diseases and Clinical Microbiology. Madrid. Editorial Médica Panamericana. 2006. Farreras-Rozman. Internal Medicine. 16th Ed. Elsevier España, S.L. 2009

Interesting links

www.seimc.org
www.escmid.org
www.scmimc.org
www.asm.org
www.cdc.gov