

Academic Year/course: 2022/23

26709 - Microbiological diagnostic and therapeutic procedures

Syllabus Information

Academic Year: 2022/23

Subject: 26709 - Microbiological diagnostic and therapeutic procedures

Faculty / School: 104 - Facultad de Medicina

229 - Facultad de Ciencias de la Salud y del Deporte

Degree: 304 - Degree in Medicine

305 - Degree in Medicine

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

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1.2. Context and importance of this course in the degree

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1.3. Recommendations to take this course

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2. Learning goals

2.1. Competences

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2.2. Learning goals

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2.3. Importance of learning goals

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3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

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4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, laboratory practice, autonomous work, study and assessment tasks.

Students are expected to participate actively in class throughout the semester.

Further information regarding the course will be provided on the first day of class.

4.2. Learning tasks

The learning process designed for this subject is based on the following:

Theoretical and practical classes revising the general principles of the Clinical Microbiology distributed in different parts including general microbiology, Bacteriology, Mycology, Virology, and Parasitology. The theoretical explanation is coordinated by the seminars and with the presentation of clinical cases that expose the situation of the infectious diseases produced by the above-mentioned microorganisms.

The program offered to the students to achieve the results include the following activities

- Lectures (40 h. presence classes). Theoretical classes for revising the general principles of the Clinical Microbiology distributed in parts, which they include: general microbiology, Bacteriology, Mycology, Virology, and Parasitology.
- Seminars, problems, and cases. The aim of the seminars is to deepen in some practical aspects of the subject and have been designed to propitiate the interrelationship between theoretical and practical learning. The students are divided into groups of 40 to facilitate major participation.
 - The following seminars are included:
 - 1. Microbiological direct diagnosis.
 - 2. Microbiological indirect diagnosis 1.
 - 3. Microbiological indirect diagnosis 2.
 - 4. Diagnosis of hepatitis and HIV infection.
 - 5. Parasitology: request form, collection, and transport of samples. Helmintos's movie.
 - 6. Movies of parasitic diseases.
- Laboratory practices.
 - Practices of Microbiology (3 hours presence hours)
 - 1. Collection, transport, and conservation of the samples. Safety procedure. Surface streak procedure. Gram's stain.
 - 2. Uroculture interpretation. Colony counting and significance. Biochemical tests procedures and antibiogram.
 - 3. Reading of the biochemical tests and identification of microorganisms.
 - 4. Reading of the antibiogram.

The students, in groups of 5, will deliver a portfolio on having finished the practices of microbiology, in a concise and tidy form, with a summary of the realized practices, with the schemes and the complementary documentation that they consider to be adapted to complement their learning. They will have to figure schemes and/or drawings that represent the observations and developed experiences. The above-mentioned memory also will refer to clinical practices.

- Parasitology's practices (3 hours presence classes)
- Diagnosis techniques. Macroscopic and microscopic identification of parasites.
- Evaluation: Continuous evaluation according to his participation and managing in practices. In addition, the students, in groups of 5, will deliver portfolios with schemes and a summary of the practices of parasitology, as well as the drawings, representations or comments that they consider to be suitable. Both portfolios will have a maximum extension of 5 sheets of paper, with letter Arial of 12 points and double space. They will have to submit to the Professor before the date indicated in the paragraph " Key Dates of the Subject " of this guide.
- Clinical practices (4 hours of presence classes)
 - Visit a Clinical laboratory: sections, distribution, general organization, devices (autoclaves, culture stoves, fluorescence microscope, centrifuges, etc.).
 - Configuration and activities of clinical microbiological diagnosis of different sections of the Laboratory.
 - Knowledge of big equipment and robots: enzimoimmunoassay, identification, and susceptibility testing, molecular diagnosis, blood cultures ...
 - Report and interpretation of laboratory tests.

Clinical practices in the Faculty of Sciences of the Health and of the Sport of Huesca (4 hours presence classes) will be done by means of the presentation of clinical cases in limited groups.

"Every student will be informed about the risks that it can have the accomplishment of the practices of this subject, as well as if they handle dangerous products and what to do in case of accident, and it will have to sign the commitment to expiring with the procedure of work and safety to carry out the practices. For more information, consult the information for students of the Unit of Prevention of Labor Risks: <http://uprl.unizar.es/estudiantes.html>

"Every student who carry out practical activities with personal information or of the patients' clinical history, is forced to guard the confidentiality of the same ones "

Calendar of presence classes and presentation of works

- Dates of presence classes: to see bulletin board of the center (Zaragoza and Huesca) or ADD (Zaragoza).
- Delivery dates of works: to see the paragraph " Key Dates of the Subject of this Guide " .

In FCCSD,

Given the exceptional situation of the Academic Year 2021-2022, the large group teaching system could be online, that is to say, in a synchronic telematic system, by which teachers and students will be connected through technologies that allow interaction, such as Google Meet.

4.3. Syllabus

The course will address the following topics:

- 1. Introduction to Clinical Microbiology and Parasitology. Historical memory. Current concept and content of the subject.
- 2. General characteristics of the bacteria. Structure and composition of the bacterial cell. Capsule, flagella, fimbrias, glycocalyx. Cellular wall. Cytoplasmic membrane. Cytoplasm. Bacterial chromosome. Bacterial division. Esporulation and germination.
- 3. Bacterial physiology. Metabolism and nutrition. Production of energy: aerobic and anaerobic respiration. Fermentation. Growth and reproduction. The curve of bacterial growth.
- 4. Bacterial genetics. Mutations. Plasmids, sequences of insertion, transposons, and integrons. Transfer and bacterial recombination. Transformation, transduction, conjugation, transposition.
- 5. Mechanism of action of the physical and chemical agents on the microorganisms. Sterilization and disinfection.
- 6. Antimicrobial agents. Classification, mechanisms of action and mechanisms of resistance. Methods of susceptibility study. The basis for the clinical employment of the antimicrobial agents.
- 7. Host-bacteria relationship. Bacterial ecology. Infection and infectious disease. Determinants of pathogenicity. Normal flora of human.
- 8. The basis of epidemiology and prevention. The epidemiological chain. Types of prevention
- 9. Microbiological diagnosis. Taxonomy and bacterial classification. Keys of identification. The basis for direct and indirect diagnosis (serology).

Bacteriology

- 10. Staphylococcus. *S. aureus* and related Gram-positive cocci.
- 11. Streptococcus. *S. pyogenes*, *S. pneumoniae*, *S. agalactiae*. Enterococcus,
- 12. Neisseria. *N. meningitidis* and *N. gonorrhoea*. Moraxella.
- 13. Haemophilus. *H. influenzae* and related species. AACCEK group of bacteria. Bordetella. *B. pertussis* and other species. Gardnerella vaginalis.
- 14. Legionella. Legionella pneumophila. Brucella, Francisella, Pasteurella.
- 15. Enterobacteriaceae. Opportunistic enterobacteria. Shigella and Escherichia.
- 16. Salmonella. *S. Typhi*. Yersinia. *Y. pestis*.
- 17. Pseudomonas. *P. aeruginosa*. Acinetobacter and other non-fermenting Gram-negative rods. Aeromonas y Plesiomonas.
- 18. Vibrio. *V. cholerae*. Campylobacter. Helicobacter.
- 19. Corynebacterium. *C. diphtheriae* and other species. Listeria, Erysipelothrix, Rhodococcus, Tropheryma. Bacillus. *B. anthracis*.
- 20. Clostridium. *C. botulinum*. *C. tetani*. Other species of medical interest. non-spore-forming anaerobic bacteria. Bacteroides. Prevotella, Porphyromonas, Peptostreptococcus.
- 21. Nocardia. Actinomyces.
- 22. Mycobacterium. *M. tuberculosis* and *M. leprae*. Other species of medical interest.
- 23. Treponema, Borrelia, and Leptospira.
- 24. Mycoplasma and Ureaplasma. Chlamydia and Chlamydomphila.
- 25. Rickettsia, Coxiella, Bartonella, Rochalimaea, Ehrlichia.

Mycology

- 26. Superficial and cutaneous mycoses. Malassezia furfur and dermatophytes: Microsporum, Epidermophyton, and Trichophyton. Opportunistic mycoses: Candida albicans and other species. Cryptococcus neoformans. Subcutaneous mycoses. Sporothrix schenckii
- 27. Systemic mycoses caused by dimorphic fungi: Histoplasma capsulatum, Blastomyces dermatitidis, Coccidioides immitis, Paracoccidioides brasiliensis. Aspergillus spp. and other opportunistic mycoses.

Virology

- 28. General characteristics of viruses. Structure. Symmetry. Culture. Replication. Viral genetics. Mechanisms of pathogenicity. Classification. Antiviral agents. Family Poxviridae. Family Papillomaviridae. Family Polyomaviridae. Family Adenoviridae. Family Parvoviridae.
- 29. Family Herpesviridae.
- 30. Family Orthomyxoviridae.
- 31. Families Paramyxoviridae and Coronaviridae.
- 32. Families Togaviridae, Flaviviridae, Bunyaviridae, and Reoviridae.
- 33. Families Picornaviridae, Caliciviridae, Astroviridae, Rhabdoviridae, Filoviridae, and Arenaviridae.
- 34. Family Retroviridae.
- 35. Hepatitis viruses.

Parasitology

- 36. Introduction to Clinical Parasitology. Intestinal amoebae: Entamoeba histolytica. Free-living amoebae.
- 37. Intestinal flagellates: Giardia. Dientamoeba. Ciliates: Balantidium. Urogenital flagellates: Trichomonas. Intestinal coccidian: Cryptosporidium, Cyclospora, Isospora.
- 38. Blood and tissue protozoa: Plasmodium, Trypanosoma, Leishmania and Toxoplasma.
- 39. Intestinal nematodes: Ascaris, Enterobius, Trichuris, Ancylostoma, Necator and Strongyloides. Tissue nematodes: Trichinella, Filarias.
- 40. Cestodes: Taenia solium, Taenia saginata, Echinococcus granulosus. Trematodes: Fasciola and Schistosoma.

4.4. Course planning and calendar

Calendar sessions and presentation of work

- Dates of sessions: see the bulletin board of the center (Zaragoza and Huesca) or ADD (Zaragoza).

- Dates of delivery of works: see the section "Activities and key dates of the Subject" of this Guide.

Links

Information on the WEB

- ADD of the University of Zaragoza:

<https://moodle2.unizar.es/add/>

- OCW of the University of Zaragoza

Fundamentals of serological diagnosis:

http://ocw.unizar.es/ocw/ciencias-de-la-salud-1/fundamentos-del-diagnostico-serologico/Course_listing

Serological diagnosis of infectious diseases: evolutionary curves of the tests

serological

<http://ocw.unizar.es/ocw/ciencias-de-la-salud-1/diagnostico-serologico-de-las-enfermedades-infecciosas-curvas>

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26709&Identificador=12165>