

## 26709 - Microbiological diagnostic and therapeutic procedures

### Información del Plan Docente

<b>Academic Year</b>	2016/17
<b>Academic center</b>	104 - Facultad de Medicina 229 - Facultad de Ciencias de la Salud y del Deporte
<b>Degree</b>	304 - Degree in Medicine 305 - Degree in Medicine
<b>ECTS</b>	6.0
<b>Course</b>	2
<b>Period</b>	First semester
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **1.Basic info**

#### **1.1.Recommendations to take this course**

#### **1.2.Activities and key dates for the course**

### **2.Initiation**

#### **2.1.Learning outcomes that define the subject**

#### **2.2.Introduction**

### **3.Context and competences**

#### **3.1.Goals**

#### **3.2.Context and meaning of the subject in the degree**

#### **3.3.Competences**

#### **3.4.Importance of learning outcomes**

### **4.Evaluation**

### **5.Activities and resources**

#### **5.1.General methodological presentation**

**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.

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### 5.2.Learning activities

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

Master classes (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 the theoretical and practical learning. The students are divided in groups of 40 to facilitate a 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. Helmentos'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 the 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 a portfolios with schemes and a summary of the practices of parasitology, as well as the

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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 presence classes)**

- Visit to 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 equipments and robots: enzimoimmunoassay, identification and susceptibility testing, molecular diagnosis, bloodcultures ...

- 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](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".

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### 5.3.Program

#### DIAGNOSTIC AND THERAPEUTIC MICROBIOLOGICAL PROCEDURES

#### General

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, glicocalix. Cellular wall. Citoplasmic 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. 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 patogenicity. 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 the direct and indirect diagnosis (serology).

#### Bacteriology

10. *Staphylococcus*. *S. aureus* and related Gram positive cocci.

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11. *Streptococcus*. *S. pyogenes*, *S. pneumoniae*, *S. agalactiae* . *Enterococcus*,
12. *Neisseria* . *N. meningitidis* and *N. gonorrhoeae* . *Moraxella* .
13. *Haemophilus*. *H. influenzae* and related species. AACEK group of bacteria . *Bordetella*. *B. pertussis* and other species. *Gardnerella vaginalis*.
14. *Legionella*. *Legionella pneumophila* . *Brucella*, *Francisella*, *Pasteurella*.
15. Enterobacteriaceae. Opportunistic enterobacterias. *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 *Chlamydophila* .
25. *Rickettsia* , *Coxiella* , *Bartonella*, *Rochalimaea* , *Ehrlichia*.

### Micology

26. Superficial and cutaneous mycoses. *Malassezia furfur* and dermatophytes: *Mycrosporium*, *Epidermophyton* and *Trichophyton* . Opportunistic mycoses: *Candida albicans* and other species. *Cryptococcus neoformans*. Subcutaneous mycoses. *Sporothrix schenckii*

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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. Cultive. 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*. Ciliados: *Balantidium* . Urogenital flagellates: *Trichomonas*. Intestinal coccidian: *Cryptosporidium* , *Cyclospora* , *Isospora* .

38. Blood and tissue protozoa: *Plasmodium*, *Trypanosoma*, *Leishmania* and *Toxoplasma*.

39. Intestinal nematodes: *A. scaris* , *Enterobius* , *Trichuris* , *Ancylostoma* , *Necator* and *Strongyloides* . Tissue nematodes: *Trichinella* , *Filarias*.

40. Cestodes: *Taenia solium* , *Taenia saginata* , *Echinococcus granulosus* . Trematodes: *Fasciola* and *Schistosoma* .

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### **5.4.Planning and scheduling**

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".

### **5.5.Bibliography and recomended resources**