

**NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO  
FACULTY OF VETERINARY MEDICINE**

<b>1. COURSE SYLLABUS:</b>	VETERINARY BACTERIOLOGY AND MYCOLOGY (1310)	
<b>2. SEMESTER:</b>	Third	
<b>3. CYCLE:</b>	Basic	
<b>4. AREA:</b>	Medicine and Animal Health, Public Health, Quality and Food Safety	
<b>5. COURSE TYPE:</b>	Theory and practice	
<b>6. DURATION:</b>	16 weeks	
<b>Hours per week:</b>	Theory: 5	Practice: 4
<b>Total number of hours:</b>	Theory: 80	Practice: 64
<b>7. REQUIREMENTS:</b>	1211	
<b>8. GENERAL OBJECTIVES:</b>	<p>Theory: Learn the biology of bacteria and fungi genera, of importance in Veterinary Medicine. At national level.</p> <p>Practices: The students will apply different techniques identify and differentiate the bacteria and fungi.</p>	
<b>9. TEACHING UNITS</b>		
<b>9.1. Unit 1 Introduction</b>		
9.1.1 Presentation of the course and significance of the subject in the activity of the veterinarian.		
9.1.2 Describe the importance of bacteria and fungi as agents of disease and its role in traditional and modern biotechnology.		
<b>9.2. Unit 2 Overview</b>		
9.2.1 Describe the main differences between prokaryotic and eukaryotic organisms.		
<b>9.3. Unit 3 Morphology</b>		
9.3.1 Forms and groupings of bacteria.		
9.3.2 Describe the structures of bacteria, their chemical composition and function.		
9.3.3 Fungal forms.		
9.3.4 Describe the fungal structures.		
9.3.5 Mention the reproductive structures in fungi.		
<b>9.4. Unit 4 Metabolism</b>		
9.4.1 Define autotrophic and heterotrophic microorganisms.		
9.4.2 Know the main differences between the metabolism of prokaryotic and eukaryotic cells.		

### **9.5. Unit 5 Genetics**

- 9.5.1 Define gene and genome.
- 9.5.2 Mutation and selection.
- 9.5.3 Mechanisms for transfer of genetic material.
- 9.5.4 Mention the importance of genetic manipulation.

### **9.6. Unit 6 Taxonomy**

- 9.6.1. Define the concepts in taxonomy: classification, nomenclature and identification.
- 9.6.2. Formulating the main approaches to bacterial taxonomy.
- 9.6.3 Establish the main approaches to fungal taxonomy.

### **9.7. Unit 7 Antimicrobial chemotherapy**

- 9.7.1 Know the source of the antibacterial and antifungal chemotherapy (natural, synthetic and semisynthetic).
- 9.7.2 Mention the characteristics of an ideal antimicrobial agent (selective toxicity, bactericidal effect, narrow-spectrum, stability, cost, etc.)
- 9.7.3 Explain the mechanism of action of antimicrobial agents that inhibit cell wall synthesis
- 9.7.4 Explain the mechanism of action of chemotherapeutics that disrupt the function of the cytoplasmic membrane.
- 9.7.5 Explain the mechanism of action of chemotherapeutics that inhibit the synthesis of folic acid or interfering with reactions of intermediary metabolism.
- 9.7.6 Explain the mechanism of action of chemotherapeutics that inhibit the synthesis of nucleic acids.
- 9.7.7 Explain the mechanism of action of chemotherapeutics that inhibit protein synthesis.
- 9.7.8 Describe the main mechanisms of bacterial resistance to antimicrobial agents.

### **9.8. Unit 8 Sterilization and disinfection**

- 9.8.1 Explain the importance of microorganisms in laboratories, operating rooms, clinics, etc.; in the preparation and storage of food, clinical, pharmaceutical and biological growth media, etc.
- 9.8.2 Define the concepts of asepsis, antisepsis, disinfection and sterilization.
- 9.8.3 Explain the mechanism of action of physical methods of sterilization.
- 9.8.4 Mention the constants of pasteurization and boiling.
- 9.8.5 Mention the constants that affect the action of disinfectants (cleaning, concentration, exposure time, humidity, temperature, amount and characteristics of microorganisms).
- 9.8.6 Explain the mechanism of action of different groups of disinfectants.

### **9.9. Unit 9 Collection and shipment of samples**

- 9.9.1 Sampling.
- 9.9.2 General procedures for the collection of samples for laboratory diagnosis of bacterial and fungal pathogens.
- 9.9.3 Ways and means of transport.

### **9.10. Unit 10 Pathogenicity and virulence factors**

- 9.10.1 Mention the main characteristics of the host-parasite interaction.
- 9.10.2 Define terms associated with the infectious process.
- 9.10.3 Explain the main mechanisms of virulence of microorganisms.
- 9.10.4 Know the different bacterial secretion systems (type I, type II, type III, type IV and type V) and its implication in pathogenicity.

## 9.11. Unit 11 Major bacterial and fungal agents of veterinary medicine

- 9.11.1 *Staphylococcus* spp (*S. aureus*, *Staphylococcus* coagulase negative).
- 9.11.2 *Streptococcus* spp (*S. equi* subsp. *equi*, *S. equi* subsp. *zooepidemicus*, *S. dysgalactiae* subsp. *dysgalactiae*, *S. dysgalactiae* subsp. *equisimilis*, *S. agalactiae*, *S. uberis*, *S. suis*).
- 9.11.3 *Corynebacterium* spp (*C. pseudotuberculosis*, *C. renale*, *C. cystitidis*, *C. pilosum*).
- 9.11.4 *Rhodococcus equi*.
- 9.11.5 *Erysipelothrix rhusiopathiae*.
- 9.11.6 *Listeria monocytogenes*.
- 9.11.7 *Escherichia coli* (ETEC, EPEC, EHEC, EaggEC, EIEC, UPEC, APEC).
- 9.11.8 *Salmonella enterica* y serovariedades.
- 9.11.9 *Fusobacterium necrophorum*.
- 9.11.10 *Dichelobacter nodosus*.
- 9.11.11 *Pasteurella* spp (*P. multocida*; *P. trehalose*).
- 9.11.12 *Mannheimia haemolytica*.
- 9.11.13 *Haemophilus* spp (*H. paragallinarum*, *H. parasuis*).
- 9.11.14 *Histophilus somni*.
- 9.11.15 *Actinobacillus* spp (*A. pleuropneumoniae*, *A. lignieresii*, *A. equuli*, *A. suis*).
- 9.11.16 *Bordetella* spp (*B. bronchiseptica*, *B. avium*).
- 9.11.17 *Moraxella bovis*.
- 9.11.18 *Pseudomonas aeruginosa*.
- 9.11.19 *Bacillus anthracis*.
- 9.11.20 *Paenibacillus larvae*.
- 9.11.21 *Clostridium* spp (*C. tetani*, *C. botulinum*, *C. perfringens*, *C. chauvoei*, *S. septicum*, *C. novyi*).
- 9.11.22 *Brucella* spp (*B. abortus*, *B. melitensis*, *B. suis*, *B. canis*, *B. Ovis*).
- 9.11.23 *Campylobacter* spp (*C. fetus* subsp. *fetus*, y subsp. *venerealis*, *C. jejuni*, *C. coli*).
- 9.11.24 *Leptospira* spp (y sus genotipos más importantes ).
- 9.11.25 *Brachyspira hyodysenteriae*.
- 9.11.26 *Mycobacterium* spp (*M. bovis*, *M. avium*, subsp. *avium* subsp. *paratuberculosis*).
- 9.11.27 *Actinomyces bovis*.
- 9.11.28 *Arcanobacterium pyogenes*.
- 9.11.29 *Nocardia asteroides*.
- 9.11.30 *Mycoplasma* spp (*M. bovis*, *M. mycoides* subsp. *mycoides* SC., *M. mycoides* subsp. *mycoides* LC, *M. synoviae*, *M. agalactiae*, *M. ovipneumoniae*, *M. gallisepticum*, *M. hyopneumoniae*, *M. hyosynoviae*).
- 9.11.31 *Chlamydophila* spp (*C. psittaci*, *C. abortus*, *C. pecorum*).
- 9.11.32 *Anaplasma marginale*.
- 9.11.33 *Candida albicans*.
- 9.11.34 *Malassezia pachydermatis*.
- 9.11.35 *Cryptococcus neoformans*.
- 9.11.36 Dermatofitos (*Microsporum* spp, *Trichopyton* spp y *Epidermophyton* spp).
- 9.11.37 *Coccidioides immitis*.
- 9.11.38 *Aspergillus* spp (*A. fumigatus*, *A. flavus*, *A. nidulans*).
- 9.11.39 *Histoplasma capsulatum*.
- 9.11.40 *Saprolegnia* spp (*S. parasitica*, *S. ferax*).

### PRACTICE:

1. Routine stains for bacteria and fungi.
2. Cultivation of bacteria and fungi *in vitro*.
3. Control procedures on microorganisms.

4. Normal microbiota and pathogenic properties of bacteria and fungi.
5. Electrophoresis and electroporation.
6. Procedures for identification of bacteria and fungi.
7. Gram positive cocci and bacilli aerobic pyogenic.
8. Member of the enterobacteria group.
9. Gram-negative bacilli associated with respiratory tract. Identification of dermatophytes
10. Bacterial spore identification.
11. Major fungi and bacteria associated with the reproductive system.
12. Microorganisms associated with mycetomas. Intracellular bacteria and fungi.
13. Collection, storage and shipment of samples for bacteriological and mycological analysis.
14. Processing and bacteriological and mycological diagnosis of clinical samples.

#### **10. BASIC BIBLIOGRAPHY**

1. Brooks G.F.: Manual de Microbiología Médica de Jawetz, Melnick y Adelberg 22<sup>a</sup>.ed. Manual Moderno, México, D.F., 2001.
2. Quinn P.J. *et al.*: Clinical Veterinary Microbiology. Mosby. Edinburgh, 1999.
3. Hirsh, D.C. and Zee Y.C.: Veterinary Microbiology. Blackwell, Massachusetts, 1999.
4. Hungerford, C. *et al.*: Veterinary Mycology. Laboratory Manual. Blackwell, Massachusetts, 1999.
5. Madigan, M.T. *et al.*: Microbiología de Brock. 8<sup>a</sup>. ed. Prentice May Iberia, Madrid, 1998.
6. Deacon, J.W.: Modern Mycology. 3<sup>rd</sup>. ed. Blackwell, Massachusetts,. 1999.
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#### **11. SUPPLEMENTARY BIBLIOGRAPHY**

1. Quinn P.J. *et al.*: Veterinary Microbiology & Microbial Diseases. Blackwell, Massachusetts, 2002.
2. Gyles, C.L., and Thoen, C.O.: Pathogenesis of Bacterial Infections in Animals. 2<sup>nd</sup> ed. Iowa State University Press, Ames, 1995.
3. Arenas R.: Micología Médica Ilustrada. 2<sup>a</sup>. ed. McGraw-Hill, Interamericana, Mexico, 2003.
4. Journal of Bacteriology.
5. Journal of Clinical Microbiology.
6. Infection and Immunity.
7. Microbiology.
8. Veterinary Microbiology.
9. Journal of American Veterinary Medical Association.
10. Trends of Microbiology.
11. Current Opinion in Microbiology.
12. Journal Diagnosis Investigation.
13. Veterinaria México.
14. Revista Latinoamericana de Microbiología.
15. Técnica Pecuaria.

#### **12. TEACHING METHODOLOGY**

Lectures, discussion, and interaction.  
 Guest teachers..  
 Reading and addressed comments.  
 Teamwork.  
 Application of theoretical bases in laboratory practice.  
 Practices at the teaching farms.

<b>13. COURSE EVALUATION</b>	Departmental Exams. Laboratory practices. Written exam. Oral exam. Practical exam. Oral presentations. Homework. Bibliographic research.
<b>14. REQUIREMENTS FOR TEACHING THE COURSE</b>	Veterinarian with graduate degree on Microbiology.