

VT-1530: VETERINARY PATHOLOGY II

Cuyahoga Community College

Viewing: VT-1530 : Veterinary Pathology II

Board of Trustees:

March 2020

Academic Term:

Fall 2021

Subject Code

VT - Veterinary Technology

Course Number:

1530

Title:

Veterinary Pathology II

Catalog Description:

Study and application of microbiologic techniques commonly performed in veterinary practices. Includes survey of microorganisms and associated disease conditions relevant to veterinary medicine and procedures to collect, culture and identify these microorganisms.

Credit Hour(s):

2

Lecture Hour(s):

1

Lab Hour(s):

3

Requisites

Prerequisite and Corequisite

VT-1521 Veterinary Pathology I.

Outcomes

Course Outcome(s):

Recognize the morphological and physiological characteristics of microorganisms that are clinically relevant to domestic animals.

Objective(s):

1. Discuss the differences between commensal and pathogenic organisms.
2. Define the general characteristics of bacteria, fungi, viruses, prions and other categories of microorganisms.
3. Describe the characteristics of microbes that facilitate the development of resistance to antibacterial agents.
4. Identify the elements of microbial growth, nutrition and other factors that affect microbial development and replication.

Course Outcome(s):

Apply the concepts of microbial structure and function to the causation of disease in domestic animals.

Objective(s):

1. Describe the bacteria most commonly encountered in veterinary medicine and the common clinical diseases they cause.
 2. Describe the types of viruses most commonly encountered in veterinary medicine and how their structure influences pathogenicity and control.
 3. Identify the fungal organisms most commonly encountered in veterinary medicine and the common clinical diseases they cause.
 4. Discuss the clinical diseases caused by prions in domestic animals.
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Course Outcome(s):

Apply the concepts of microbiology to medical and laboratory procedures performed in veterinary medicine.

Objective(s):

1. Discuss the implications of breaks in sterile technique when working with live animals and with laboratory samples.
2. Describe a nosocomial infection, the common causative agents and the role of veterinary staff in creation and prevention of such infections.
3. Discuss the differences between sanitary and sterile conditions and techniques.

Course Outcome(s):

Collect, prepare and evaluate veterinary microbiological samples.

Objective(s):

1. Collect samples for routine bacterial culture and/or transport and properly dispose of used samples and supplies.
2. Identify common veterinary bacterial and fungal pathogens using commercially available media and reagents.
3. Describe sample collection and/or transport for viral identification and common diagnostic assays.
4. Describe sample collection and/or transport for fungal identification and common diagnostic assays.

Methods of Evaluation:

1. Lecture examinations
2. Lecture quizzes
3. Laboratory examinations
4. Laboratory quizzes
5. Homework assignments
6. Attendance
7. Journal article reviews
8. Research papers

Course Content Outline:

1. Fundamentals of microbiology
 - a. Brief history of microbiology
 - b. Biosecurity
2. Bacterial morphology
 - a. Shape, size, arrangement
 - b. Cell structure
3. Common bacterial species and associated diseases
 - a. Gram-positive cocci
 - b. Gram-positive rods
 - c. Acid-fast bacteria
 - d. Gram-negative bacteria
 - e. Anaerobes
 - f. Spirochetes
 - g. Mycobacteria
 - h. Obligate intracellular organisms
4. Bacterial metabolism
 - a. Biochemical pathways
 - b. Bacterial identification
5. Bacterial growth
 - a. Methods of reproduction
 - b. Rate of growth
 - c. Requirements for growth
 - d. Physical requirements
 - e. Chemical requirements
 - f. Control of microbial growth

- i. Conditions influencing microbial growth and control
 - 1. Temperature
 - 2. Type of microbes
 - 3. Environment
 - g. Actions of microbial control agents
 - i. Alteration of membrane permeability
 - ii. Damage to proteins and nucleic acids
 - 1. UV light
 - 2. Heat
 - iii. Physical methods
 - 1. Filtration
 - iv. Chemical methods
 - 1. Quaternary ammonium compounds
 - 2. Phenolics
 - 3. Bleach
 - 4. Iodine
 - 5. Chlorhexidine
 - 6. Alcohols
 - 7. Aldehydes
 - v. Cleaning vs. disinfection
- 6. Bacterial genetics
 - a. DNA, RNA and gene expression in bacteria
 - b. Mutation
 - c. Transfer of genetic material
 - d. Recombinant DNA
 - e. Biotechnology
- 7. Viruses
 - a. Characteristics
 - b. Structure
 - c. Classification of viruses
 - i. Double-strand DNA, single-strand DNA, double-strand RNA, single-strand RNA (sense and antisense)
 - ii. Adenoviruses
 - iii. Herpesviruses
 - iv. Poxviruses
 - v. Parvoviruses
 - vi. Rhabdoviruses
 - vii. Retroviruses
 - viii. Orthomyxoviruses
 - d. Viral replication
 - e. Identification of viruses
 - i. Antibody-based tests (ELISA)
 - ii. Polymerase chain reaction (PCR)
 - iii. DNA sequencing
 - f. Prions
 - i. Characteristics
 - ii. Structure
 - iii. Multiplication
 - iv. Clinical diseases
- 8. Fungal organisms
 - a. Characteristics
 - b. Classification of fungi
 - i. Dermatophytes
 - ii. Yeasts
 - 1. Malassezia
 - 2. Candida
 - 3. Coccidioides
 - 4. Cryptococcus
 - 5. Histoplasma
 - 6. Blastomyces

7. Sporothrix
8. Aspergillus
9. Interaction between microbe and host
 - a. Host-microbe relationships
 - i. Normal flora
 - ii. Pathogenic organisms
 - b. The disease process
 - i. Transmission of disease
 - ii. Pathogenic properties of microbes
 1. Physical
 2. Chemical
 - iii. Epidemiology
 - iv. Drug resistance
 - c. Sample collection for bacterial evaluation
 - i. Common specimen types
 1. Swabs
 2. Urine
 3. Blood
 4. Tissue
 5. Milk
 6. Feces
 - ii. Packaging and shipping
 1. Labeling
 2. Temperature control
 3. Aerobic or anaerobic swab in culture media
 4. Broth
 5. Sterile dry containers
 6. Urine
 7. Fluid aspirates
 - iii. Human safety concerns while handling specimens
 - d. Sample processing for bacterial agents
10. Microscopic slide preparations
 - a. Diff-Quick or Wright's stain
 - b. Gram stain
 - c. Acid-fast stain
11. Bacterial culture
 - a. Equipment
 - b. Basic techniques
 - c. Sample contamination
 - d. Safety
 - e. Disposal of specimens and used media
 - f. Culture media
 - i. Liquid broth vs solid agar
 - ii. Plate vs slant tube
 - iii. Enrichment media
 - iv. Selective media
 - v. Differential media
 - g. Incubation and monitoring of samples
12. Biochemical tests for identification
 - a. Catalase test
 - b. Oxidase test
 - c. Coagulase test
13. Organism identification and characteristics
 - a. Qualitative assessment
 - b. Semi-quantitative assessment
 - c. Susceptibility testing

- i. Minimum inhibitory concentration (MIC)
 - ii. Broth dilution
 - iii. Disc diffusion (Kirby-Bauer method)
- d. Quality control
- 14. Sample collection and processing for fungal analysis
 - a. Common sample types
 - i. Swabs
 - ii. Hair
 - iii. Biopsy
 - iv. Fluid aspirates
 - v. Cytology
 - b. Human safety concerns
 - c. Direct microscopic examination for *Malassezia*
 - i. Diff-Quick or Wright's stain
 - d. Dermatophyte test medium
- 15. Nosocomial infections
 - a. Definition
 - b. Causes
 - i. Patient factors
 - ii. Pathogen factors
 - iii. Environmental factors
 - iv. Handling by veterinary personnel
 - c. Role of fomites
 - d. Zoonotic agents
 - e. Prevention and control
 - i. Handwashing
 - ii. Environmental hygiene and management
 - iii. Vaccination
 - iv. Personal protective equipment
 - f. Common agents
 - i. Bacteria, including emergence of drug-resistant bacteria (e.g., MRSA)
 - ii. Viral

Resources

Tortora, Gerard J., Funke, Berdell R., Case, Christine L. . *Microbiology An Introduction*. 13th. San Francisco, Pearson, Benjamin Cummings, 2019. 2019.

Leboffe, Michael J., and Pierce, Burton E. *A Photographic Atlas for the Microbiology Laboratory*. 4th ed. Englewood, CO: Morton Publishing, 2011.

Bassett, Joanna M. and Thomas, John A. *Clinical Textbook for Veterinary Technicians*. 9th ed. St. Louis, MO: Elsevier Saunder, 2018.

Cowan, M. Kelly. *Microbiology: A Systems Approach*. 5th ed. Boston, MA: McGraw Hill, 2018.

McVey, D. Scott, Kennedy, Melissa, and Chengappa, M.M. *Veterinary Microbiology*. 3rd ed. Ames, IA: John Wiley Sons, 2013.

Resources Other

Veterinary Microbiology, Editors in chief - Adler, B., Meng, X.J., Schwarz, S., and Truyen, U., peer-reviewed periodical. <https://www.sciencedirect.com/journal/veterinary-microbiology> (<https://www.sciencedirect.com/journal/veterinary-microbiology/>)

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