

Module title:	Veterinary microbiology module 2	ECTS	4
Polish translation:	Mikrobiologia Weterynaryjna moduł 2		
Course:	<b>Veterinary Medicine</b>		

Module language: English		Stage: JM-FVM	
Form of studies: <input checked="" type="checkbox"/> intramural <input type="checkbox"/> extramural	Type of module: <input checked="" type="checkbox"/> basic <input type="checkbox"/> directional	<input checked="" type="checkbox"/> mandatory <input type="checkbox"/> elective	Semester: 4 <input type="checkbox"/> winter semester <input checked="" type="checkbox"/> summer semester
Academic year: <b>2022/2023</b>		Catalogue number:	FVM-V-JMSS-03W-B10/1_19

Module coordinator:	<b>Dr Anna Golke</b>
Teachers responsible for the module:	<b>Academic teachers of the Institute of Veterinary Medicine, Department of Preclinical Sciences, PhD students in accordance to the internal legal acts; other specialists if needed and possible</b>
Objectives of the module:	<p>The purpose of the veterinary microbiology module is to give the prospective veterinary surgeon adequate knowledge and skills that are applicable to veterinary medicine. Emphasis is placed on understanding the nature of infectious organisms, mechanisms by which they cause disease and how the host responds to infection. Veterinary medicine students are expected to learn the role of microbiota in health and disease, recognize the importance of biosecurity, public health threat posed by zoonotic diseases, and microbial contamination of food of animal origin. The program is designed to integrate bacteriology, mycology and virology. Also an opportunity is provided for student to practice basic laboratory techniques and procedures used in diagnostics of microbial disease. The course is designed to enable the student fulfil the national and EU educational requirements and achieve competence in veterinary microbiology.</p> <p>The content of the lectures supplements the content of the laboratory, practical classes.</p>
Teaching forms, number of hours:	<p>a) Lectures; hours: <b>30</b>  b) Laboratory classes; hours: <b>45</b>  c) Seminars; hours ...;  d) Clinical laboratories; hours ...;  e) Field exercises; hours ...;</p>
Teaching methods:	<p><u>Lectures</u>: the lectures emphasize selected aspects in bacteriology, mycology and virology presented in original multimedia presentations deal with the basic characteristics of animal pathogens, mechanisms of pathogenesis and how these relate to symptoms and laboratory diagnosis. Lectures are intended to provide illustration, clarification and update information which will be further detailed through laboratory classes.</p> <p><u>Laboratory classes</u>: individual students carry out scheduled tasks under instruction and supervision of qualified teaching staff. Classes are performed in adequately equipped laboratories to ensure full training in all areas of veterinary microbiology</p> <p><b>Lectures, 2 hrs/week</b></p> <ol style="list-style-type: none"> <li>1. Characteristics of Gram-positive irregular rods of the genera: Corynebacterium, Rhodococcus, Streptomyces.</li> <li>2. Characteristics of aerobic and microaerophilic Gram-negative rods and cocci of the genera: Pseudomonas, Burkholderia, Taylorella, Francisella.</li> <li>3. Characteristics of aerobic and microaerophilic Gram-negative rods and cocci of the genera: Moraxella, Bordetella, Brucella, Bartonella, Coxiella.</li> <li>4. Characteristics of bacteria of the genus: Mycobacterium.</li> <li>5. Characteristics of bacteria of the genera: Pasteurella, Mannheimia, Actinobacillus, Gallibacterium, Haemophilus and Histophilus.</li> <li>6. Characteristics of Facultatively anaerobic Gram-negative rods of the order Enterobacterales. The genera: Escherichia, Salmonella, Klebsiella, Enterobacter, Citrobacter, Proteus, Morganella, Edwardsiella, Shigella, Yersinia, Plesiomonas.</li> <li>7. Characteristics of Facultatively anaerobic Gram-negative rods of the order Enterobacterales. The genera: Escherichia, Salmonella, Klebsiella, Enterobacter, Citrobacter, Proteus, Morganella, Edwardsiella, Shigella, Yersinia, Plesiomonas – continuation.</li> <li>8. Microbiota of gastrointestinal tract of ruminants and other animal species. Probiotics. Silage and the role of bacteria in ensiling forage.</li> <li>9. Spirochaetes, Order Spirochaetales,; The genera: Treponema, Brachyspira, Leptospira and Borrelia. Gram-negative helical rods. The genera: Campylobacter and Helicobacter.</li> <li>10. General Mycology: morphology and physiology of fungi. Mechanisms of fungal pathogenicity.</li> <li>11. Taxonomy and major groups of fungi pathogenic for animals and humans.</li> <li>12. Etiology of dermatomycoses and systemic mycoses. Dimorphic fungi.</li> <li>13. Mycotoxins and mycotoxicoses. Methods for detection of fungal toxins.</li> <li>14. Introduction to virology. Nature, structure and taxonomy of viruses. Virus as a subcellular infectious structure/agent. Replication of viruses. Strategies of replication.</li> <li>15. Propagation of viruses, virus-host cell interactions, types of viral infections and their consequences, viral latency. Viral transformation and viral oncogenesis. Subviral infectious structures/agents. Prions, their properties.</li> </ol>

	<p><b>Laboratory practicals, 3hrs (2+1)/week</b></p> <ol style="list-style-type: none"> <li>1. Bacteriological diagnostics for non-spore-forming Gram positive, regular rods of the genera: Erysipelothrix and Listeria.</li> <li>2. Bacteriological diagnostics for irregular Gram-positive rods of the genera: Corynebacterium, Trueperella, Actinomyces, Arcanobacterium. Bacteriological diagnostics for Gram-positive bacteria of the genera: Rhodococcus and Nocardia.</li> <li>3. Bacteriological diagnostics for Gram-negative rods of the genera: Pseudomonas, Burkholderia. Moraxella, Bordetella.</li> <li>4. Methods for diagnostics of mycobacterial infections/diseases in animals. Methods for diagnostics of paratuberculosis in cattle.</li> <li>5. Bacteriological diagnostics for Gram-negative rods of the genera: Pasteurella, Mannheimia, Actinobacillus, Gallibacterium, Haemophilus and Histophilus.</li> <li>6. Routine bacteriological diagnostics for microorganisms of the order Enterobacterales. Laboratory investigation for Yersinia spp.</li> <li>7. Laboratory investigation for Salmonella spp.</li> <li>8. Biochemical tests used for identification of enteric rods – classic tests and API tests. Serological identification of salmonellae (serotyping). Laboratory diagnostics of the opportunistic infections with pathogenic E.coli strains.</li> <li>9. Microbiota of gastrointestinal tract in animals. Ruminal and intestinal microbiota.</li> <li>10. Microscopic examination of fungi, cultivation of fungi, identification and differentiation of dimorphic fungi and yeasts.</li> <li>11. Cultivation of mycelial fungi; their morphology and phenotyping. Identification of dermatophytes.</li> <li>12. Mycelial fungi cont. Molds and their differentiation.</li> <li>13. Bacteriological diagnostics for helical rods of the genera: Campylobacter and Helicobacter Bacteriological diagnostics for spiral bacteria of the genera: Brachyspira, Leptospira and Borrelia.</li> <li>14. Propagation of animal viruses. Viral growth in cell cultures, cytopathic effects, viral inclusion bodies, viral hemagglutination. Propagation of animal viruses in embryonated chicken eggs.</li> <li>15. Bacteriophages</li> </ol> <p>...</p> <p>Additional meetings with students – consultations: 2h / week. Detailed schedule will be defined by the coordinator of the course at the beginning of semester. Detailed organization of consultations will be defined by the coordinator of the course at the beginning of semester.</p>		
Formal prerequisites and initial requirements:	Chemistry, Biochemistry module 1, Biophysics, Histology and embryology modules 1-2, Cell biology, General and veterinary genetics. Basic knowledge and skills from chemistry, biophysics, histology, cell biology		
Learning effects	Course outcomes:	Learning outcomes relative to the course outcomes	Impact on the course outcomes*
Knowledge:	<ul style="list-style-type: none"> <li>• Student knows the structure of bacteria, fungus and virus particles.</li> <li>• Student knows organization of genetic material and its implication on virulence and chemotherapeutics resistance.</li> <li>• Student understands the physiology of microbial growth including how this is influenced by changes in the local environment.</li> <li>• Student understands the continuum from microbial colonization to infection to disease.</li> <li>• Student is familiar with microbial virulency. Understands the role of microbes in health maintenance</li> <li>• Student knows the scientific names of the most significant disease causing agents and the associated diseases.</li> </ul>	A.W.13, A.W.15, A.W.17, A.W.18	3 3 3 3
Skills:	<ul style="list-style-type: none"> <li>• Student applies safety rules for handling clinical or laboratory specimens containing pathogens.</li> <li>• Student can process clinical specimens aseptically and properly.</li> <li>• Student performs and interprets microbiological tests in the microbiology laboratory.</li> <li>• Student recognize unique characteristics of pathogens and names associated with the agent(s).</li> </ul>	A.U.10, A.U.11, B.U.6	3 3 3
Competences:	<ul style="list-style-type: none"> <li>• Student is able to explain importance of microbes for the animal health and welfare.</li> <li>• Student is competent to detect and identify microorganisms, and determine the epidemiologic links between isolates.</li> </ul>	K.S.9	3

<p>Objectives of the module required to obtain learning effects:</p>	<p>The purpose of the veterinary microbiology module is to give the prospective veterinary surgeon adequate knowledge and skills that are applicable to veterinary medicine. Emphasis is placed on understanding the nature of infectious organisms, mechanisms by which they cause disease and how the host responds to infection. During the microbiology course -module 1, a student of the Faculty of Veterinary Medicine acquires basic knowledge about selected eukaryotic, prokaryotic and subcellular groups of pathogens for animals and humans. Students learn about the mechanisms of their pathogenic activity, isolation and identification methods.</p> <p>Veterinary medicine students are expected to learn the role of microbiota in health and disease, recognize the importance of biosecurity, public health threat posed by zoonotic diseases, and microbial contamination of food of animal origin. The program is designed to integrate bacteriology, mycology and virology. Also an opportunity is provided for student to practice basic laboratory techniques and procedures used in diagnostics of microbial disease. The course is designed to enable the student fulfil the national and EU educational requirements and achieve competence in veterinary microbiology.</p>
<p>Assessment methods:</p>	<p>During the semester there will be three written or oral tests, in the form of six open questions, from the areas of knowledge passed on in lectures (three questions) and practical classes (three questions). The person conducting the practical classes decides about the written or oral form, passing this information on to students during the first classes in the semester. The detailed scope of material applicable to individual tests will be given at the beginning of the semester. Colloquia carried out in written or oral form take place on the same principles. Each question is rated on a scale of 0 to 2 points (you can get 0, 0.5, 1, 1.5, 2 pt.), depending on the correct content contained in the answer. The maximum number of points from each colloquium is 12. To pass the colloquium a minimum of 6.5 points is required. Marks from the tests are issued on the basis of the total number of points obtained: · 12 and 11.5 pt. - very good · 11 and 10.5 pts - good plus · 10 and 9.5 pts - good · 9, 8.5 and 8 pts. - sufficient plus · 7.5, 7 pts. and 6.5 pts – sufficient</p> <p>Moreover, at the end of the semester, students are required to pass a practical test in veterinary microbiology, consisting of the independent performance of the task with the result. The practical test covers the material provided in the classes on the subject of microbiology in the winter and summer semester. Each student receives one, randomly selected practical question. Depending on the type of the question, the student performs descriptions of microbial growth, staining, assesses microscopic preparations, performs additional tests leading to the recognition of the microorganism. Then, the student is required to describe in detail (in writing) the entire diagnostic process, including making drawings from under the microscope and describing additional tests that could be performed to confirm the result. After that, the student reports it orally to the person conducting the practical test. The examiner can also ask additional questions concerning the microorganisms investigated by the student. The assessment obtained from the practical test is influenced by the correct performance and interpretation of tests leading to diagnosis and the knowledge of other techniques confirming the diagnosis. A maximum of 12 points can be obtained from the practical test, a minimum of 6.5 points is required to pass.</p> <p>Two dates are foreseen for each test, taking place on the same basis. The second term may be joined by students who have not obtained the required minimum number of points or those who were absent on the first date. Absences at the tests excused within a maximum of 7 days (legally valid medical leave) do not lead to the loss of the first term. Unexcused absence at the test is treated as a loss of term (student receives 0 pt.).</p> <p>Activity during classes: the teacher evaluates students in terms of their involvement in performing practical tasks (macroscopic and microscopic assessment of the growth of microorganisms, preparation, preparation of additional tests, cultures of clinical materials, participation in the discussion regarding the interpretation of cultures' results). Active students may be granted a "+", which is taken into account at the end of the semester. A positive assessment of the student's activity in practical classes may lead to an increase in the final semester grade by a maximum of 0.25%. This is an individual decision of the teacher conducting practical classes. The final mark from the microbiology module 2 is taken into consideration during the final grading of the microbiology course.</p> <p>Apart from the indicated methods of verification of learning outcomes (three tests and assessment of activity during classes) no additional methods are foreseen.</p> <p>In a top-down situation, suspending the implementation of classes at the University and the need for distance learning, other methods of verifying the learning outcomes implemented are appropriate to the situation.</p> <p>...</p> <p>In case of unforeseen, unusual circumstances mandatory remote teaching and remote assessment methods might be adopted.</p>
<p>Detail description of assessment methods;</p> <p>Formal documentation of learning outcome:</p>	<p><b>During the summer semester, four progressive assessments are conducted in the in-contact form (3 written tests and one practical test) .</b></p> <p><b>The assessments dates are listed in the schedule on the course website.</b></p> <p>However, in cases depending on the current external conditions determined by the published legal acts, the form of evaluation tests as well as the exam will be modified from the in-contact form to the remote form, applying either Moodle platform or MS Teams platform. In such a case, the evaluation tests and the exam will be conducted in the form of a <b>multiple-choice test</b>. The students will be informed in advance about the changes regarding the evaluation tests and the exam. Otherwise, the tests will be carried out in the in-contact form with open-ended questions.</p>

	<table border="1"> <thead> <tr> <th colspan="2">Possible grades to obtain from one assessment</th> </tr> <tr> <th>Grade</th> <th>Number of points</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>11,5-12</td> </tr> <tr> <td>4.5</td> <td>10,5-11</td> </tr> <tr> <td>4.0</td> <td>9,5-10</td> </tr> <tr> <td>3.5</td> <td>8-9</td> </tr> <tr> <td>3.0</td> <td>6,5-7,5</td> </tr> <tr> <td>2</td> <td>6 or less</td> </tr> </tbody> </table> <p>...</p> <p>No extra assessment methods are anticipated.</p> <p>eHMS entry. Records collected in the course portfolio i.e. individual records of student results, presence lists, database of oral and written questions, written assessments of the students.</p>	Possible grades to obtain from one assessment		Grade	Number of points	5	11,5-12	4.5	10,5-11	4.0	9,5-10	3.5	8-9	3.0	6,5-7,5	2	6 or less
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Elements impelling final grade:	<p>Pursuant to the regulations of studies, a student cannot have more than 20% absence from classes (9 hours of practical classes/semester). The final grade of the Microbiology course consists of the grade obtained from practical classes (25% - the winter semester, 25% the summer semester) and the final grade from the exam (50%). In case of excused absence at the final exam, the student does not lose the term.</p> <table border="1"> <thead> <tr> <th>Final grade at the end of the Veterinary Microbiology course</th> <th>Obtained average of semester grades and the grade from the final exam.</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>4,75-5</td> </tr> <tr> <td>4.5</td> <td>4,25-4,74</td> </tr> <tr> <td>4.0</td> <td>3,75-4,24</td> </tr> <tr> <td>3.5</td> <td>3,25-3,74</td> </tr> <tr> <td>3.0</td> <td>3,0-3,24</td> </tr> <tr> <td>2</td> <td>2</td> </tr> </tbody> </table>	Final grade at the end of the Veterinary Microbiology course	Obtained average of semester grades and the grade from the final exam.	5	4,75-5	4.5	4,25-4,74	4.0	3,75-4,24	3.5	3,25-3,74	3.0	3,0-3,24	2	2		
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Teaching base:	Lecture halls at the Faculty of Veterinary Medicine, laboratories in the Department of Preclinical Sciences																
Mandatory and supportive materials :																	
<ol style="list-style-type: none"> <li>Lecture presentations with links to relevant scientific publications.</li> <li>Quinn P.J., Markey B.K, Leonard F.C., Hartigan P., Fanning S., FitzPatrick E.S.: Veterinary Microbiology and Microbial Disease. Wiley- Blackwell, 2011.</li> <li>Songer G.J., Post K.W.: Veterinary microbiology: bacterial and fungal agents of animal disease. Elsevier, 2005.</li> <li>Madigan M.T., Martinko J.M.: Biology of microorganism. Pearson Prentice Hall, 2006</li> <li>Salyers A.A., Whiet D.D. : Bacterial pathogenesis, a molecular approach. ASM Press, Washington, D.C. 2002.</li> <li>Gyles C.L., Prescott J.F., Songer J.G., Thoen Ch.O.: Pathogenesis of bacterial infections in animals. Wiley-Blackwell, 2010.</li> <li>Giguere S., Prescott J.F., Baggot J.D., Walker R.D., Dowling .: Antimicrobial Therapy in Veterinary Medicine. Wiley-Blackwell, 2007</li> </ol> <p>Relevant scientific publications including those of the module coordinator.</p>																	
ANNOTATIONS																	

\* 3 – complete and detailed, 2 – moderate, 1 – basic.

Quantitative summary of the module:

Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module - base for quantifying ECTS:	<b>150 h</b>
Total ECTS points, accumulated by students during contact learning:	<b>4 ECTS</b>