

UNIVERSITY OF ZAGREB  
FACULTY OF VETERINARY MEDICINE  
Heinzlova 55  
Tel. 01/2390 111  
Division:  
Department / Clinic:  
Department of Microbiology and Infectious Diseases with Clinic  
Email: pinter@vef.hr  
Register no.:  
File no.:  
Zagreb, 1.2.2021.

### COURSE SYLLABUS

Course name: GENERAL MICROBIOLOGY

Academic year 2020-21

Course leader: Prof Ljiljana Pinter, DVM

Teachers: Prof Ljiljana Pinter, DVM, Prof Nevenka Rudan, DVM

Associate teachers: Assist Prof Selma Pintarić, DVM

First day of classes: 13.4.2021.

Last day of classes: 2.6.2021.

Timetable for LECTURES academic year 2020-2021

LECTURES				
Date	Methodological unit	Teacher	Location / time	Literature
13.4.2021.	<b>Introductory lecture</b> - Microbiology development and its importance in veterinary medicine (the scope of microbiology, microscope, development of microbiology, Pasteur, Koch) <b>Bacterial morphology</b> (shape, size, structure, mobility). <b>Bacterial spores</b> (shape, size, structure). <b>(2 hours lectures)</b>	Prof Ljiljana Pinter, DVM	Amphiteatre / 10-12h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
15.4.2021.	<b>Structure of bacterial cell</b> (+ differences in cell wall structures, gram +, gram -) <b>(2 hours lectures)</b>	Prof Ljiljana Pinter, DVM	Amphiteatre / 10-12h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
5.5.2021.	<b>Antibiotics and mechanisms of their effects</b> (antimicrobials in veterinary medicine) <b>(2 hours lectures)</b>	Prof Nevenka Rudan, DVM	Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 12-14h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
10.5.2021.	<b>Virology development</b> (definition, shape, size, study methods)	Prof Nevenka Rudan, DVM	Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.

	<p><b>Basic properties of viruses. Physical properties and chemical composition of viruses.</b></p> <p><b>Antigenic properties. Viral replication. Viral cultivation. Effects of viral cell infection. (2 hours lectures)</b></p>			<p>Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders</p>
17.5.2021.	<p><b>Bacteriophages and phagotyping.</b></p> <p><b>Viral genetics. Viral interference.</b></p> <p><b>Tumours. (2 hours lectures)</b></p>	<p>Prof Nevenka Rudan, DVM</p>	<p>Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 9-11h</p>	<p>Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.</p> <p>Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders</p>
19.5.2021.	<p><b>11,12 Morphology, physiology and reproduction of yeast and moulds (shape, size, structure, spores). (2 hours lectures)</b></p>	<p>Prof Ljiljana Pinter, DVM</p>	<p>Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 8-10 h</p>	<p>Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.</p> <p>Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders</p>

**Timetable for SEMINARS academic year 2020-2021**

<b>SEMINARS</b>					
<b>Date</b>	<b>Methodological unit</b>	<b>Teacher</b>	<b>Group</b>	<b>Location / time</b>	<b>Literature</b>
14.4.2021.	1,2 <b>Bacterial physiology</b> (growth temperature, humidity, oxygen, pH) <b>Bacterial toxins</b> <b>(2 hours seminar)</b>	Prof Ljiljana Pinter, DVM		Amphiteatre / 10-12 h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
7.5.2021.	3,4 <b>Bacterial genetics</b> (mutation, transduction, transformation, conjugation) <b>(2 hours seminar)</b>	Selma Pintarić		Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
12.5.2021.	5,6 <b>Bacterial resistance</b> (development and	Selma Pintarić		Lecture Room, Department of	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe.

	transfer) (2 hours seminar)			Microbiology and Infectious Diseases with Clinic / 14-16 h	London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
18.5.2021.	7,8 Effects of physical and chemical factors on viruses. Antiviral chemotherapy (2 hours seminar)	Prof Nevenka Rudan, DVM		Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
24.5.2021.	9,10 Prions and viroids; Viral diseases diagnostics (laboratory diagnostics) (2 hours seminar)	Prof Nevenka Rudan, DVM		Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 12-14h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
2.6.2021.	11,12 Dermatophytes (isolation and identification) (2 hours seminar)	Prof Ljiljana Pinter, DVM		Lecture Room, Department of Microbiology and Infectious Diseases with Clinic / 16-18h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders


### Timetable for PRACTICALS academic year 2020-2021

PRACTICALS						
Date	Methodological unit	Teacher	Type of practical	Group	Location / time	Literature
13.4.2021.	1,2 Introduction + laboratory equipement and microscope – (2	Prof Ljiljana Pinter, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 13-15h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.

	<b>hours practical)</b>					Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
26.4.2021.	<b>3,4 Material and handling procedures for microbiological and serological examination – (2 hours practical)</b>	Prof Ljiljana Pinter, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic /8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
27.4.2021.	<b>5,6 Sterilisation and liophylisation – (2 hours practical)</b>	Prof Ljiljana Pinter, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic /8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
28.4.2021.	<b>7,8 Bacteriological media and culture procedures - (2 hours practical)</b>	Selma Pintarić	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 12-14h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders

29.4.2021.	9,10 <b>Microscopic slides - native – (2 hours practical)</b>	Selma Pintarić	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 10-12h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
3.5.2021.	11,12 <b>Staining techniques I. chapter - Gram stain – (2 hours practical)</b>	Prof Nevenka Rudan, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 10-12h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
7.5.2021.	13,14 <b>Staining techniques II. Chapter – Giemsa stain and Ziehl-Neelsen – (2 hours practical)</b>	Selma Pintarić	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 10-12h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
13.5.2021.	15,16 <b>Bacterial physiology methods – (2 hours practical)</b>	Selma Pintarić	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.



						Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
14.5.2021.	17,18 Testing for the drug susceptibility of microbes – (2 hours practical)	Selma Pintarić	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 14-16h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
20.5.2021.	19,20 Culture techniques and identification of fungus – (2 hours practical)  Colloquium I	Prof Ljiljana Pinter, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
25.5.2021.	21,22 Identification of dermatophytes – (2 hours practical)	Prof Ljiljana Pinter, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders

26.5.2021.	23,24 <b>Viral cultivation I. chapter – (2 hours practical)</b>	Prof Nevenka Rudan, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic /16-18h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
27.5.2021.	25,26 <b>Viral cultivation II. chapter – (2 hours practical)</b>	Prof Nevenka Rudan, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 14-16h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
31.5.2021.	27,28 <b>Practical work in virology laboratory - tripsinisation; CPE – (2 hours practical)</b>	Prof Nevenka Rudan, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 8-10h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
1.6.2021.	29,30 <b>Practical work in virology laboratory - PCR; electrophoresis in gel – (2 hours practical)</b>	Prof Nevenka Rudan, DVM	laboratory		Practical hall, Department of Microbiology and Infectious Diseases with Clinic / 16-18h	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.

	<b>practical)</b> Colloquium II					Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders

### STUDENT OBLIGATIONS

Lecture attendance	Minimum points are 3 (min 6 hours of lectures), and maximum are 6 points (max 12 hours of lectures) for class attendance.
Seminars attendance	Minimum points are 4 (min 8 hours of seminar), and maximum are 6 points (max 12 hours of seminar) for class attendance.
Practicals attendance	Minimum points are 4 (min 20 hours of exercises), and maximum are 6 points (max 30 hours of exercises) for class attendance.
Active participation in seminars and practicals	For exercises and seminar activities maximum points are 10 (35 points out of three grading elements), and minimum are 5 points (min 16 points out of three grading elements): a) prepared for exercises and seminars and b) successful experimental work (total 35, coefficient 0.2857). Five point is for successful preparation for exercises and seminars gained by oral examination. One point is for successful exercises, signed in student notebook. Preparation for exercises and seminars is 10 points (total 20),

	and each successful experimental work is 1 point (total 15 points for 15 exercises).
Final exam	Final written exam has 40 questions (1 question = 1 point). A student must give correct answers to 24 questions in order to gain a minimum of 24 points. Maximum is 40 points.
Examination requirements	Student requirements are defined in the Regulations on the Integrated Undergraduate and Graduate Study of Veterinary Medicine. Given the above, the student must acquire a minimum number of points from all assessment elements in order to take the final exam. <b>Article 45:</b> a student can justifiably be absent from up to 50 % of the lectures; 30% of the seminars and 30 % of the exercises.

### GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	20.5.2021., 1.6.2021.
Final exams (dates)	18/3/21, 19/4/21, 24/6/21, 8/7/21, 6/9/21, 21/9/21
Form of final exam	written

### LITERATURE

Obligatory literature	Quinn, P. J., M. E. Carter, B. K. Markey, G. R. Carter (1994): Clinical Veterinary Microbiology. M. Wolfe. London.  Songer, J. Glenn, K. W. Post (2005): Veterinary Microbiology. Bacterial and Fungal Agents of Animal Disease. Elsevier Saunders
Optional literature	1. MS TEAMS/Class Materials 2. Hajsig, D., F. Delaš (2016): Priručnik za vježbe iz opće mikrobiologije. Sveučilišni priručnik, Hrvatsko mikrobiološko društvo, Zagreb. 3. Naglič, T., D. Hajsig, J. Madić, L. Pinter (2005): Specijalna veterinarska bakteriologija i mikologija. Veterinarski fakultet Sveučilišta u Zagrebu i Hrvatsko mikrobiološko društvo 4. Web pages of the Department of Microbiology and Infectious Diseases with the Clinic of the Faculty of Veterinary

Medicine, University of Zagreb.

5.Presečki, V. et al. (2002): Virologija, Medicinska naklada, Zagreb.

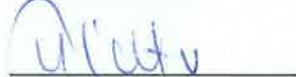
### OBJECTIVES AND LEARNING OUTCOMES

Course objectives	Microbiology is an important preclinical course where students are prepared for further understanding of lessons in General pathology and pathological morphology, Pharmacology and clinical courses such as infectious diseases and microbial intoxication of animals. Procedures of sterilization, of sampling and sending different materials for further microbiological and immunological tests, simple procedures of microorganism identification, including use of commercial compounds suitable for veterinarians in practice will be offered throughout practical work to students attending the course. Lessons and practices in microbiology offer basic knowledge on morphology, physiology, specific qualities of cultivation and identification, antigen properties, tenacity, relation to antimicrobial substances, pathogenicity of particular microorganisms and methods of aethiological diagnostics as well as possibilities of immunoprophylaxis of infectious diseases.
Learning outcomes	After successfully passing the course student will be able to: <ol style="list-style-type: none"> <li>1. Understanding the basic principles and techniques for isolation and identification of pathogenic microorganisms, and what diagnostic tests should be performed for their identification;</li> <li>2. Interpreting the meaning of the results of microbiological examination in the process of etiological diagnosis of infectious diseases; Information of classification the bacteria, viruses and fungi with genera and species important for veterinary medicine;</li> <li>3. Knowledge about specifics of microorganism grows, virulence properties of microorganism and disease it causes;</li> <li>4. Understanding what specimens should be collected and get acquainted with preventive and therapeutic strategies.</li> </ol>

**GRADING SCHEME**

<i>Points</i>	<i>Grade</i>
Up to 59	1 (F)
60-68	2 (E)
69-76	2 (D)
77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Course leader:



Head of Department/Clinic:



Note: The course leader is required to submit a Course Syllabus to all teachers and associates pertaining to the Course.