

## DESCRIPTION OF THE COURSE OF STUDY

<b>Course code</b>		
<b>Name of the course in</b>	Polish	<b>Mikrobiologia</b>
	English	<b>Microbiology</b>

### 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

<b>1.1. Field of study</b>	medicine
<b>1.2. Mode of study</b>	Full-time
<b>1.3. Level of study</b>	Uniform Master's studies
<b>1.4. Profile of study*</b>	General academic
<b>1.5. Person preparing the course description</b>	
<b>1.6. Contact</b>	

### 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

<b>2.1. Language of instruction</b>	<b>English</b>
<b>2.2. Prerequisites*</b>	Anatomy, Histology, Physiology

### 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

<b>3.1. Form of classes</b>	LECTURE: 20 ; CLASSES – 40; LABORATORIES: 40
<b>3.2. Place of classes</b>	Lecture /Classes/Laboratories - Courses in the teaching rooms of JKU
<b>3.3. Form of assessment</b>	LECTURE – E, CLASSES – Zo (credit with grade)
<b>3.4. Teaching methods</b>	Practical classes, conversational lecture, discussion,
<b>3.5. Bibliography</b>	<b>Required reading</b>
	<b>Further reading</b>

1. Medical Microbiology  
Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller  
Elsevier, 2015

2. .Medical Microbiology  
F. H. Kayser, K. A. Bienz, J. Eckert, R. M. Zinkernagel  
Thieme, 2004

3. Praktyczny atlas mikrobiologii dla studentów kierunków medycznych  
Practical atlas of microbiology for students of medical divisions  
Maria Dąbrowska-Szponar, Katarzyna Garbacz, Lidia Piechowicz  
2012

1. Hospital Acquired Infections  
Prevention & Control  
Purva Mathur  
LWW, 2010

### 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

#### 4.1. Course objectives (including form of classes)

##### *Lecture*

- Acquaintance with biological characteristics and classification of microorganisms.
- Knowing the morphology of bacteria, basics of genetics and physiology
- Understanding antimicrobial defense mechanisms
- Acquaintance with the basic definitions of infection
- Identification of the main pathogens of microorganisms
- Presentation of general characteristics as well as clinical significance of pivotal pathogenic bacteria
- Basics of diagnosis and therapy of viral infections

##### *Classes*

- Theoretical knowledge of the collecting principles, storing and transmitting material for research
- Acquaintance with the main groups of antimicrobials drugs and their modes of action on bacterial / fungal cells
- Getting to know the principles of rational targeted and empirical antibiotic therapy
- Familiarity with the clinically important mechanisms of microbial resistance to antibiotics

- Knowledge of the principles of disinfection and sterilization based on knowledge of the basics of epidemiology of infectious diseases - especially in the situation of hospital infections

#### **Laboratories**

- Diagnosis of etiological factors and mechanisms of pathogenesis of infections caused by microorganisms
- Selection of microbiological / serological tests depending on the type of infection and potential etiological factors
- Practical knowledge of the collecting principles, storing and transmitting material for microbiological examination
- Acquire the ability to interpret the results of microbiological and serological tests
- Practical presentation of clinically important antibiotic resistance mechanisms for antibiotics
- Acquisition of practical skills of proper hands disinfection
- Acquire skills to distinguish between hospital and non-hospital infections

#### **4.2. Detailed syllabus (including form of classes)**

- 4.2.1.1. Classification and general characteristic of microorganisms.
5. Forms and mechanisms of interaction in a microbe-host.
6. The normal flora of humans.
7. Etiopathogenesis and epidemiology of infections (source of infection, transmission routes, susceptible population, risk factors)
8. Microbiological diagnostics
9. The basic group of antimicrobial drugs - mechanism of action, spectrum
10. Clinically important mechanisms of antimicrobial resistance to antibiotics
11. Empiric and targeted therapy.
12. Disinfection, sterilization and aseptic procedure.
13. Prevention of infections.
14. Hospital infections.

#### **LECTURES:**

**Lecture 1** Fundamentals of microbiology. Introduction to medical microbiology

**Lecture 2** Basic anti-microbial defense mechanisms. Etiopathogenesis of infectious diseases. Human microbe

**Lecture 3** General characteristics and clinical relevance of selected groups of pathogenic bacteria- part I

**Lecture 4** General characteristics and clinical relevance of selected groups of pathogenic bacteria- part II

**Lecture 5** Fundamentals of mycology. Etiological factors of fungal infections. Antifungal drugs.

**Lecture 6** Introduction to antibiotic therapy. Strategies for the search for new antibacterial drugs

**Lecture 7** Characteristics, clinical significance of mycobacteria.

**Lecture 8** Basics of virology. Viral agents for etiologic infections in humans

**Lecture 9** Viral agents for etiologic infections in humans- part II. Viral infections - the basis of diagnosis and therapy.

**Lecture 10** Infections associated with biofilm formation.

#### **CLASSES:**

**Classes 1** Health and Safety principles at the Microbiological Laboratory. Structure of the bacterial cell. Morphology of bacteria. Microscopic methods used in microbiology.

**Classes 2** Microbiological Research Techniques – culture on solid and liquid substrates.

**Classes 3** Microbiological diagnostics in practice - classes in the hospital microbiological laboratory.

**Classes 4** Microbial growth control: aseptic, antiseptic, disinfection, sterilization.

**Classes 5** Characterization of selected Gram-positive bacteria (*Staphylococcus*, *Streptococcus*, *Enterococcus*, *Listeria*, *Corynebacterium*, *Bacillus*).

**Classes 6** Characteristics of selected gram-negative rods *Enterobacteriaceae*, *Vibrio*, *Aeromonas*, *Plesiomonas*, non fermenting gram negative rods: *Pseudomonas*, *Acinetobacter*, *Burkholderia*, *Stenotrophomonas maltophilia*

**Classes 7** Gram-negative cocci (*Neisseria*, *Moraxella*). Small gram negative rods *Haemophilus*, *Bordetella*. Others: *Legionella pneumophila*. *Mycoplasma pneumoniae*, *Chlamydia*.

**Classes 8** Characteristic of selected anaerobic bacteria and actinomycetes *Actinomyces*, *Nocardia*.

**Classes 9** Yeasts and molds (fungi). Diagnosis of mycosis.

**Classes 10** TEST 1 (including classes 7-9 and laboratories 8- 9).

**Classes 11** Antibiotics. Marking methods of microbial susceptibility.

**Classes 12** Clinically important mechanisms of microbial resistance to antibiotics, their Detection and clinical significance.

**Classes 13** Upper and lower respiratory tract infections.

**Classes 14** Selected infections of the skin and soft tissues, including surgical site infection.

**Classes 15** Urinary tract infections

**Classes 16** Gynecological infections– multi-bacterial vaginosis, trichomoniasis, thrush. Sexually transmitted diseases.

**Classes 17** Gastric and intestinal infections. Food poisoning.

**Classes 18** Infection of the blood bearing. Endocarditis.

**Classes 19** Infections of the central nervous system

**Classes 20** Test including 15-19 and laboratories 16-19.

#### **LABORATORIES:**

**Laboratory 1** Handwashing Hygiene / hand disinfection. Formation and staining preparation. Principles of microscopy

**Laboratory 2** Exemplary solid and liquid substrates used in bacteriological diagnostics - assessment of the type of growth and morphology of the colony– assessment of growth and colony morphology. Materials inoculations, Culture establishment.

**Laboratory 3** Commercial tests used to identify microorganisms: diagnostic discs, tests. Demonstration of apparatus used in the microbiological laboratory.

**Laboratory 4** Microbiological control of hospital space. Microbiological control of air. Control of hands disinfection. Control of sterilization processes.

**Laboratory 5** Characterization of growth and morphology of selected Gram-positive bacteria. Selected identification tests

**Laboratory 6** Growth and morphology characteristics of selected Gram-negative sticks. Evaluation of growth on the substrates, evaluation of microscope preparations, performance of selected identification tests.

**Laboratory 7** Test– classes and laboratories 1-6

**Laboratory 8** Presentation of culture of selected anaerobic bacteria, evaluation of microscopic preparations, demonstration of commercial biochemical tests. Analysis of microbiological results.

**Laboratory 9** Yeast and mold fungus. Classical diagnostics of mycosis. Presentation of culture, evaluation of microscopic preparations, demonstration of commercial biochemical tests.

**Laboratory 10** Serological and molecular diagnostics of mycosis. Antifungal drugs. Analysis of mycological results.

**Laboratory 11** performance of the antibiogram using diffusion-pulse method for selected microorganisms.

**Laboratory 12** Reading and interpretation of antibiograms for selected microorganisms. Reading and interpretation of E-tests. Antibiograms with resistance mechanisms: ESBL, MRSA, VRE, other (presentation, discussion, interpretation)

**Laboratory 13** Upper and lower respiratory tract infections – collection of test materials, analysis of sample referrals, diagnostics, analysis of sample results of microbiological tests.

**Laboratory 14** Selected skin and soft tissue infections – collection of test materials, diagnostics, analysis of sample results of microbiological tests.

**Laboratory 15** Test- classes 11-14 and laboratories 10-14

**Laboratory 16** Diagnosis of urinary tract infections and selected sexually transmitted infections. Carriage of Streptococcus agalactiae in pregnant women – detection, prevention. Analysis of sample results.

**Laboratory 17** Diagnosis of infectious diarrhea. Diagnosis, treatment, prevention of infection with Clostridium difficile etiology

**Laboratory 18** Diagnosis of blood bearing infections. Principles of blood collection for microbiological examination. Analysis of microbiological results . Evaluation of microscopic preparations.

**Laboratory 19** Infections of the central nervous system – diagnostics, evaluation of microbiological preparations and exemplary results of microbiological tests.

**Laboratory 20** Interpretation of Microbiological Test Results. Selected methods for the control of hospital infections.

#### 4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of <b>KNOWLEDGE</b> the graduate knows and understands:		
W01	microorganisms, including pathogenic ones and those present in the normal flora;	C.W12.
W02	the epidemiology of infections with viruses, bacteria as well as fungal and parasites infections, including geographical range of their occurrence;	C.W13.
W03	the impact of abiotic and biotic (viruses, bacteria) environmental factors on the human body and population of people and their ways of penetration into the human body; describes the implications of the human body exposure to various chemical and biological factors and prevention principles;	C.W14.
W04	the symptoms of iatrogenic infections, routes of biological dispersal and pathogens causing changes in individual organs;	C.W18.
W05	the basics of microbiological and parasitological diagnosis;	C.W18.
W06	the basics of disinfection, sterilization and aseptic procedures;	C.W20.
within the scope of <b>ABILITIES</b> the graduate knows how to:		
U01	operate the optical microscope, also making use of immersion;	A.U1.
U02	assess environmental hazards and uses basic methods allowing to detect the presence of harmful agents (biological and chemical) in the biosphere;	C.U6.
U03	recognize the most common human parasites on the basis of their construction, life cycles and symptoms of the disease	C.U7.
U04	prepare a microscopic formulation and recognizes pathogens under a microscope;	C.U9.
U05	interpret the results of microbiological tests;	C.U10.

4.4. Methods of assessment of the intended learning outcomes																						
Teaching outcomes (code)		Method of assessment (+/-)																				
		Exam oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Others*		
		Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes					
		L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...
W01		+																				
W02		+																				
W03		+																				
W04		+																				
W05		+																				
W06		+																				
U01																					+	
U02																					+	
U03																					+	
U04																					+	
U05																					+	

\*delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes		
Form of classes	Grade	Criterion of assessment
lecture (L)	3	61%- 68%
	3,5	69%-76%
	4	77%-84%
	4,5	85%-92%
	5	93%-100%
classes (C)*	3	61%- 68%
	3,5	69%-76%
	4	77%-84%
	4,5	85%-92%
	5	93%-100%
others (...)*	3	Learning programme content on the basic level, replies chaotic, leading questions necessary 61%-68%
	3,5	Learning programme content on the basic level, answers systematized, requires assistance from the teacher 69%-76%
	4	Learning programme content on the basic level, answers systematized, independent. Solving of problems in typical situations. 77%-84%
	4,5	The scope of presented knowledge exceeds the basic level based on the supplementary literature provided. Solving of problems in new complex situations 85%-92%
	5	The scope of presented knowledge exceeds the basic level based on independently acquired scientific sources of information. 93%-100%

**15. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT**

Category	Student's workload
	Full-time studies
<i>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</i>	<b>100</b>
<i>Participation in lectures*</i>	<b>20</b>
<i>Participation in classes, seminars, laboratories*</i>	<b>80</b>
<i>Preparation in the exam/final test*</i>	
<i>Others*</i>	
<i>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</i>	<b>100</b>
<i>Preparation for the lecture*</i>	<b>20</b>
<i>Preparation for the classes, seminars, laboratories*</i>	<b>80</b>
<i>Preparation for the exam/test*</i>	
<i>Gathering materials for the project/Internet query*</i>	
<i>Preparation of multimedia presentation</i>	
<i>Others (please specify e.g. e-learning)*</i>	
<b>TOTAL NUMBER OF HOURS</b>	<b>200</b>
ECTS credits for the course of study	<b>8</b>

*\*delete as appropriate*

**Accepted for execution** (date and legible signatures of the teachers running the course in the given academic year)

.....