**DESCRIPTION OF THE COURSE OF STUDY**

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| **Course code** | **0912-7LEK-C-Mi** | |
| **Name of the course in** | polish | **Mikrobiologia z parazytologią**  **Microbiology with parasitology** |
| english |

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

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| **1.1. Field of study** | Medicine |  |
| **1.2. Mode of study** | Full time |  |
| **1.3. Level of study** | Uniform Master’s studies |  |
| **1.4. Profile of study\*** | Practical |  |
| **1.5. Person/s preparing the course description** | prof. zw. dr hab. Robert Bucki |  |
| **1.6. Contact** | robert.bucki@ujk.edu.pl |  |

1. **GENERAL CHARACTERISTICS OF THE COURSE OF STUDY**

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| **2.1. Language of instruction** | English |  |
| **2.2. Prerequisites\*** | anatomy, histology, physiology |  |

1. **DETAILED CHARACTERISTICS OF THE COURSE OF STUDY**

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| * 1. **Form of classes** | | **lecture: 35h (including 5 hours of e-learning), classes – 40, laboratories – 35** |
| * 1. **Place of classes** | | Lecture /Classes/Laboratories - Courses in the teaching rooms of JKU, e-learning platform |
| * 1. **Form of assessment** | | lecture – E, classes / laboratories – credit with grade |
| * 1. **Teaching methods** | | Practical classes, conversational lecture, discussion |
| * 1. **Bibliography** | **Required reading** | 1. *Mikrobiologia lekarska*, Heczko P., Wróblewska M., Pietrzyk A., PZWL, Warszawa, 2014,  2. *Mikrobiologia*, Murray P.R., Rosenthal K.S., Pfaller M.A. Wydanie polskie, Elsevier Urban & Partner, Wrocław, 2011,  3. Błaszkowska J., Ferenc T., Kurnatowski P. Zarys parazytologii medycznej. Wyd. Edra Urban I Partner 2017  4. Deryło A.(red.): Parazytologia i akaroentomologia medyczna: podręcznik dla studentów, nauczycieli akademickich, lekarzy praktyków i pracowników laboratoriów diagnostycznych. Wyd. Naukowe PWN 2012. |
| **Further reading** | 1. *Diagnostyka bakteriologiczna* pod redakcją: Eligia M. Szewczyk Wydawnictwo Naukowe PWN, Warszawa, 2019,  2. *Antybiotykoterapia praktyczna*, Dzierżanowska D., α-medicapress, 2018,  3. Buczek A.: Choroby pasożytnicze. Epidemiologia diagnostyka, objawy. Wydawnictwo Koliber, Lublin 2010  5. Kadłubowski R., Kurnatowska A. Zarys parazytologii lekarskiej. Wydawnictwo Lekarskie PZWL, Warszawa 2001  6. Kuźna-Grygiel W., Kołodziejczyk L.: Przewodnik do ćwiczeń z parazytologii lekarskiej, Wyd. Pomorskiej Akademii Medycznej, Szczecin 2003 |

1. **OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES**

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| **4.1 .Course objectives (for all forms of the course)**  ***Lecture***   * Acquaintance with biological characteristics and classification of microorganisms. * Knowing the morphology of bacteria, basics of genetics and physiology. * Understanding antimicrobial defense mechanisms * Understanding of human microbiota. * Acquaintance with basic microbial virulence factors. * Knowing the basic characteristics and clinical significance of key bacterial groups, as well as mycobacteria, fungi and viruses causing infections in humans. * Knowing the rational antibiotic therapy principles as well as strategy to seek novel therapeutics aimed at infection therapy. * The basics of diagnostics and therapy of viral infections. * Understanding of biology of selected human parasites. * Knowing the anatomical and morphological structure of selected human parasites. * Understanding the role that parasites play in humans and animals. * The basics of diagnostics and therapy of parasitoses. * Learning the methods to collect and store materials for diagnostics of parasitoses.   ***Classes***   * Learning the basic methods used in microbiological diagnostics. * Theoretical considerations concerning collection, storage and transport of microbiological material. * Selection of microbiological/serological/molecular tests according to the type of infection and potential etiological factors. * Learning the main groups of antibiotics (also: the most modern ones) and the mechanisms of action against bacterial / fungal cell. * Learning the most clinically relevant mechanisms of bacterial drug resistance. * Acquaintance with clinical forms and etiological factors of: urinary tract infections; respiratory tract infections; gynecological infections; STDs; skin and soft tissue infections; bloodborne infections / endocarditis; bone and bone marrow infections; CNS infections. * Learining the most common parasitoses in Poland / worldwide. * Learning about uncommon / imported parasitoses in Poland. * Learning about parasitic arthropods and arthropods acting as parasitics vectors. * Learning of basic principles of parasitic diagnostics.   ***Laboratories***   * Practical means of work with potentially infectious materials. * Practical aspects of proper hand disinfection. * Practical aspects of proper sampling, storage and transportation of material for microbiological examination. * Identification of basic bacterial / fungal etiological factors (colony morphology on solid media, practical use of rapid preliminary diagnostic tests). * Acquaintance with light microscopy, Gram-staining method as well as recognition of morphology of bacterial/ fungal cells in microscopy preparations. * Practical aspects of diagnostics via bacterial culture, including the rules to culture of anaerobic bacteria. * Practical aspects of mycological diagnostics (culture, serology). * Learning the interpretation of simple microbiological test results as well as interpretation of clinically relevant drug resistance mechanisms. * Recognition and analysis of selected parasites as well as structures characteristic of these parasites in microscopy preparations. * Learning of basic techniques of parasitic diagnostics. |
| **4.2. Detailed syllabus (for all forms of the course)**  **Lectures:**  **Semester I - Winter**  **Lecture 1.** Basics of microbiology. Introduction to clinical microbiology.  **Lecture 2.** Basic antimicrobial defence mechanisms. Ethiopathogenesis of infectious diseases. Human microbiota.  **Lecture 3.** General characteristics and clinical importance of selected groups of pathogenic bacteria, pt. I.  **Lecture 4.** General characteristics and clinical importance of selected groups of pathogenic bacteria, pt. II.  **Lecture 5.** Basics of mycology. Etiological factors of mycoses.  **Semester II – Summer**  **Lecture 6.** Antifungal drugs.  **Lecture 7.** Characteristics and significance of mycobacteria.  **Lecture 8.** Basics of virology. Viral etiological factors in humans, pt. I.  **Lecture 9.**  Basics of virology. Viral etiological factors in humans, pt. II.  **Lecture 10.** Principles of viral infection diagnostcs and therapy.  **Lecture 11.** Infections due to formation of biofilm.  **Lecture 12.** Introduction to antibiotic therapy. Strategies used to seek for novel antibiotics.  **Lecture 13.** Microbiology in clinical practise.  **Lecture 14.** Basic concepts of parasitology. Mechanism of parasitic pathogenicity. MEdical parasitology of: gastrointestinal tract; urogenital tract; blood and tissues.  **Lecture 15.** Tropical parasitoses.  **Lecture 16.** Principles of parasitic diagnostics. Prophylaxis, treatment and containment methods.  **Lecture 17.** Medical parasitology: parasitic protozoans, ectoparasites and ectoparasitoses.  **CLASSES:**  **Semester I – Winter**  Class 1. Safety procedures in microbiology lab. Bacterial cell structure. Bacterial morphology. Methods for microbiological diagnostics – microscopy; cultures. Concepts of bacterial identification.  Class 2. Microbiological diagnostics in practice – classes in hospital microbiology lab.  Class 3. Characteristics of selected G(+) bacteria (*Staphylococcus, Streptococcus, Enterococcus, Listeria, Corynebacterium, Bacillus).*  Class 4. Characteristics of selected G(-) rods: *Enterobacterales*, *Vibrio, Aeromonas, Plesiomonas,* non-fermenting rods: *Pseudomonas, Acinetobacter, Burkholderia*, *Stenotrophomonas maltophilia*  Class 5. Characteristics of selected G(-) cocci (*Neisseria, Moraxella*). Small G(-) rods: *Haemophilus, Bordetella.* Others: *Legionella pneumophila. Mycoplasma pneumoniae, Chlamydia, Chlamydophila.*  Class 6. Characteristics of selected anaerobes and actinomycetes: *Actinomyces*, *Nocardia*.  Class 7. Yeasts and molds. Diagnostics of mycoses.  Class 8. **COLLOQUIUM**  **Semester II – Summer**  **Class 1.** Antibiotics, pt. I.  **Class 2.** Antibiotics, pt. II.  **Class 3.** Clinically important drug resistance mechanisms, detection methods and clinical relevalence.  **Class 4.** Upper and lower respiratory tract infections.  **Class 5.** Urinary tract infections.  **Class 6.** Gynecological tract infections. Multibacterial vaginosis, trichomoniasis, candidiasis. STDs.  **Class 7.** Selected skin and soft tissue infections.  **Class 8.** Bloodborne infections/ endocarditis. Bone and bone marrow infections.  **Class 9**. Central nervous system infections.  **Class 10**. Gastrointestinal tract infections. Food poisoning.  **Class 11. COLLOQUIUM**  **Class 12.** The most common helminths of Poland. *Nematoda*.  **Class 13.** *Trematoda*.  **Class 14.** *Cestoda* – Tapeworms; parasites of intestines, tissues and organs.  **LABORATORIES:**  **Semester I – Winter**  **Lab class 1.** Proper hygienic hand washing/ disinfection procedure. Preparation of stained specimens. Rules of light microscopy. Microbial reduction inoculation on selected media.  **Lab class 2.** Media/ commercial tests used in microbiology – demonstration. The most common devices used in microbiology – demonstration.  **Lab class 3.** A demonstration of cultures of selected G(+) and G(-) bacteria on solid media – assesment of type of growth and colony morphology. Carrying out the selected identification tests for G(-) and G(+) bacteria.  **Lab class 4.** **COLLOQUIUM (1h)**  **Lab class 5.** Culture of selected anaerobic bacteria, assesment of microscopy samples, demonstration of commercial biochemical tests. Analysis of microbiological test results.  **Lab class 6.** Yeasts and molds. Classical mycosis diagnostics. Demonstration of cultures, assesment of microscopy samples, demonstration of commercial biochemical tests.  **Semester II– Summer**  **Lab class 1.** Methods for microbial susceptibility determination. Disk-diffusion method for making antibiograms of selected microorganisms.  **Lab class 2.** Test results assesment and interpretation of antibiograms for selected microorganisms. E-test results assesment and interpretation. Antibiograms with certain drug resistance mechanisms: ESBL; MRSA; VRE; others (demonstration, assesment, interpretation).  **Lab class 3**. Upper and lower respiratory tract infections – sampling, sample refferal analysis, diagnostics, assesment of sample test results.  **Lab class 4. COLLOQUIUM**  **Lab class 5.** Diagnostics of urinary tract infections and selected STDs. Urine sampling procedure using semi-quantitative method, urine sample culture assesment, bacteriuria level assesment, Gram-stained preparations assesment – for multibacterial vaginosis, gonorrhoea, vaginal candidiasis. Analysis of sample test results.  **Lab class 6.** Selected skin and soft tissue infections – sampling methods, diagnostics, sample test results assesment.  **Lab class 7.** Bloodborne infections diagnostics. CNS infections. Guidelines for blood sample collection. Microscopy preparations examination. Sample test results assesment.  **Lab class 8. Infectious diarrhea diagnostics.** Diagnostyka biegunek infekcyjnych. Rapid test for detection of *Clostridioides difficile.*  **Lab class 9.** **COLLOQUIUM**  **Lab class 10.** *Nematoda* – the diagnostics.  **Lab class 11.** *Trematoda* – the diagnostics**.**  **Lab class 12.** *Cestoda* – the diagnostics  **Lab class 13.** Parasitic protozoans, ectoparasites.  **Lab class 14.** COLLOQUIUM for all previous classes.  **Lab class 15.** COLLOQUIUM for all previous lab classes – the bacteria/ fungi/ parasites. |

* 1. **Education outcomes in the discipline**

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| **Code** | **A student, who passed the course** | **Relation to learning outcomes** |
| within the scope of **knowledge** 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; | C.W14. |
| W04 | the implications of the human body exposure to various chemical and biological factors and prevention principles; | C.W15. |
| W05 | invasive human forms or stages of development of selected parasitic fungi, protozoa, helminths and arthropods, including geographical coverage of their occurrence; | C.W16. |
| W06 | the functional principle of the parasite - host pair and knows the basic symptoms of illnesses caused by parasites; | C.W17. |
| W07 | the symptoms of iatrogenic infections, routes of biological dispersal and pathogens causing changes in individual organs; | C.W18. |
| W08 | the basics of microbiological and parasitological diagnosis; | C.W19. |
| W09 | the basics of disinfection, sterilization and aseptic procedures; | C.W20. |
| within the scope of **ABILITIES** 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. |
| within the scope of **SOCIAL COMPETENCE**, the graduate is able to: | | |
| K01 | recognize his/her own limitations and self-evaluate educational deficiencies and needs; | H.S5 |
| K02 | use reliable information sources; | H.S7 |
| K03 | conclude on the basis of own surveys and observations; | H.S8 |
| K04 | introduce rules of social conduct and teamwork to the group of specialists, including specialists form other medical professions also in the multicultural and multinational environment; | H.S9 |
| K05 | give opinions concerning various aspects of professional activity; | H.S10 |
| K06 | take responsibility for own decisions made during professional activities including own safety and safety of other people; | H.S11 |

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| * 1. **Methods of assessment of the intended teaching outcomes** | | | | | | | | | | | | | | | | | | | | | |
| **Teaching**  **outcomes**  **(code)** | **Method of assessment (+/-)** | | | | | | | | | | | | | | | | | | | | |
| **Exam**  **oral/written\*** | | | **Test\*** | | | **Project\*** | | | **Effort**  **in class\*** | | | **Self-study\*** | | | **Group works\*** | | | **Othersq\*** | | |
| ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | | ***Form of***  ***classes*** | | |
| *W* | *C* | *...* | *W* | *C* | *...* | *W* | *C* | *...* | *W* | *C* | *...* | *W* | *C* | *...* | *W* | *C* | *...* | *W* | *C* | *...* |
| W01 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W02 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W03 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W04 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W05 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W06 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W07 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W08 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| W09 | ***+*** |  |  |  | ***+*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| U01 |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  | ***+*** |  |  | ***+*** |  |  |  |  |
| U02 |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  | ***+*** |  |  | ***+*** |  |  |  |  |
| U03 |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  | ***+*** |  |  | ***+*** |  |  |  |  |
| U04 |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  | ***+*** |  |  | ***+*** |  |  |  |  |
| U05 |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  | ***+*** |  |  | ***+*** |  |  |  |  |
| K01-K06 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** |  |

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| * 1. **Criteria of assessment of the intended teaching outcomes** | | |
| **Form of classes** | **Grade** | **Criterion of assessment** |
| **lecture (W)** | **3** | 61-68% Mastering the content of the curriculum at the basic level, chaotic answers, necessary leading questions. |
| **3,5** | 69-76% Mastering the content of the curriculum at the basic level, systematized answers, requires the teacher's help. |
| **4** | 77-84% Mastering the content of the curriculum at the basic level, systematic and independent answers.  Problem solving in typical situations. |
| **4,5** | 85-92% The scope of the presented knowledge goes beyond the basic level based on the supplementary literature provided. Problem solving in new and complex situations. |
| **5** | 93% -100% The scope of the presented knowledge exceeds the basic level based on self-acquired scientific sources of information |
| **classes (C)** | **3** | 61-68% Mastering the content of the curriculum at the basic level, chaotic answers, necessary leading questions. |
| **3,5** | 69-76% Mastering the content of the curriculum at the basic level, systematized answers, requires the teacher's help. |
| **4** | 77-84% Mastering the content of the curriculum at the basic level, systematic and independent answers.  Problem solving in typical situations. |
| **4,5** | 85-92% The scope of the presented knowledge goes beyond the basic level based on the supplementary literature provided. Problem solving in new and complex situations. |
| **5** | 93% -100% The scope of the presented knowledge exceeds the basic level based on self-acquired scientific sources of information |
| **Laboratories (L)** | **3** | 61-68% Mastering the content of the curriculum at the basic level, chaotic answers, necessary leading questions. |
| **3,5** | 69-76% Mastering the content of the curriculum at the basic level, systematized answers, requires the teacher's help. |
| **4** | 77-84% Mastering the content of the curriculum at the basic level, systematic and independent answers.  Problem solving in typical situations. |
| **4,5** | 85-92% The scope of the presented knowledge goes beyond the basic level based on the supplementary literature provided. Problem solving in new and complex situations. |
| **5** | 93% -100% The scope of the presented knowledge exceeds the basic level based on self-acquired scientific sources of information |

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

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| **Category** | **Student’s workload** |
| **Full-time studies** |
| *NUMBER OF HOURS IMPLEMENTED WITH DIRECT PARTICIPATION OF THE TEACHER / CONTACT HOURS /* | ***110*** |
| *Participation in lectures \** | 30 |
| *Participation in classes, seminars, laboratories \** | 75 |
| *Participation in the exam / final test \** |  |
| *Others\** | 51 |
| *INDEPENDENT STUDENT WORK / NON-CONTACT HOURS /* | ***90*** |
| *Preparation for the lecture \** | 40 |
| *Preparation for the classes, seminars, laboratories \** | 50 |
| *Preparation for the exam / final test \** |  |
| *Gathering materials for the project/ Internet query\** |  |
| *Preparation of multimedia presentation* |  |
| *Others \** |  |
| ***TOTAL NUMBER OF HOURS*** | ***200*** |
| **ECTS credits for the course of study** | **8** |

***\*delete as appropriate***

*1e-learning*

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

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