**INFORMATION ABOUT THE COURSE**

# Clinical microbiology

## 1. Basic information

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| **Field of studies**<br>field of medical and health sciences, discipline: medical sciences<br>**Unit responsible for the field of studies**<br>Faculty of Medicine Bydgoszcz University of Science and Technology<br>**Level of studies**<br>Uniform master's studies<br>**Profile of studies**<br>General academic<br>**Form of studies**<br>Full-time | **Studies cycle**<br>……..<br>**Course code**<br>17-EMS-CMI-SP1<br>**Language**<br>English<br>**Obligatory**<br>Yes |

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| **Prerequisites** | None |
| **Introductory courses** | None |
| **Coordinator** | Tomasz Bogiel, PhD |

| **Study period** | **Form of assessment**<br>**Form and hours of classes** | **ECTS credits** |
|---|---|---|
| Winter semester | Exam<br>Lecture 30h<br>Exercise 50h | 6.0 |

## 2. Learning outcomes

| **Code** | **Description of learning outcomes** | **Learning outcomes reference** |
|---|---|---|
| **Knowledge (student knows and understands):** | | |
| K1 | The graduate knows and understands the genetic mechanisms of microorganisms acquiring drug resistance and their relationship with the need to individualize pharmacotherapy | C.W9. |
| K2 | The graduate knows and understands microorganisms, including pathogenic microorganisms and those constituting the human microbiome | C.W10. |
| K3 | The graduate knows and understands the epidemiology of infections caused by viruses, bacteria, fungi and prions, taking into account the geographical range of their occurrence | C.W11. |
| K4 | The graduate knows and understands the pathogenesis and pathophysiology of infections and contagions and the impact of pathogenic factors, such as viruses, bacteria, fungi, prions, on the human body and population, including the ways in which they affect | C.W12. |

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| K5 | The graduate knows and understands the etiology, pathogenesis, transmission routes, forms and prevention of iatrogenic infections | C.W14. |
| K6 | The graduate knows and understands the methods used in microbiological diagnostics and (indications, principles of performance, interpretation result) | C.W15. |
| K7 | The graduate knows and understands the principles of disinfection, sterilization and aseptic procedure | C.W17. |
| K8 | The graduate knows and understands the problem of drug resistance and the principles of rational antibiotic therapy | C.W32. |
| **Abilities (student can do/perform):** | | |
| A1 | The graduate is able to recognize pathogens under a microscope | C.U5. |
| A2 | The graduate is able to interpret the results of microbiological tests | C.U6. |
| **Social skills (the student is ready to):** | | |
| S1 | The graduate is ready to notice and recognize their own limitations, make self-assessment of deficits and educational needs | O.K5. |
| S2 | The graduate is ready to formulate opinions on various aspects of professional activity | O.K10. |
| S3 | The graduate is ready to accept responsibility related to decisions made as part of professional activity, including in terms of their own safety and the safety of others. | O.K11. |

## 3. Programme contents

| No. | Programme contents | Form of studies | Learning outcomes covered by the programme content |
|---|---|---|---|
| 1 | Introduction to the subject. Biological characteristics of microorganisms. Systematization of microorganisms pathogenic to humans. Structure and metabolism of bacteria. Genetics of bacteria. Sporulation and germination. Microbiota, microbiome, carriage, colonization, infection and infectious disease. Pathogenicity of microorganisms and their virulence factors. Pathogenesis of bacterial infections. Formation and role of biofilm. Antimicrobial immunity: innate and acquired. Vaccines and therapeutic sera. Antibiotics and chemotherapeutics. Mechanisms of bacterial resistance to antibiotics and chemotherapeutics. Rational antibiotic therapy. General mycology with the pathogenesis of fungal infections. Mycotoxin-producing fungi causing allergies and mycoses. Methods of identifying microorganisms, including molecular diagnostics. Basics of hospital infections in health care units. Microbiology of hospital infections - etiological factors. Basics of hospital infection control (hand hygiene, patient isolation principles). Cardiovascular infections caused by microorganisms. Bacteremia and sepsis. Respiratory infections caused by microorganisms. Gastrointestinal infections caused by microorganisms. | Lecture | K1, K2, K3, K4, K5, K6, K7, K8 |

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|---|---|---|---|
| | Nervous system infections caused by microorganisms. Eye infections. Skin and subcutaneous tissue infections, musculoskeletal infections, urinary tract infections. Congenital and perinatal infections, and sexually transmitted infections. | | |
| 2 | Basic principles of occupational health and safety in a microbiology laboratory. Sterilization and disinfection. The influence of physical and chemical factors on bacteria. Bacteria in the human environment. Methods of culturing bacteria. Techniques for making microbiological preparations. Basics of bacteriological diagnostics – cell morphology, methods of staining preparations, microscopic observations, biochemical and serological tests. Molecular (PCR) methods of identification and species differentiation of microorganisms. Morphology, growth requirements, isolation and methods of identification of individual groups of bacteria of clinical importance: gram-positive cocci, aerobic rods and bacilli, gram-negative rods and cocci, anaerobic bacteria, Actinomycetales. Yeast-like and filamentous fungi of clinical importance – morphology, reproduction and identification. Assessment of drug susceptibility of microorganisms (Kirby-Bauer method, E-tests). Etiology and diagnostics of respiratory infections. Etiology and diagnosis of urinary tract infections. Etiology and diagnosis of digestive tract infections. Etiology and diagnosis of nervous system infections, bloodstream infections and sepsis. Skin, eye and ear infections. | Exercise | A1, A2, S1, S2, S3 |

## 4. Methods of verifying and assessing the learning outcomes achieved by the student

### Winter semester

| **Form of studies** | | |
|---|---|---|
| **Lecture** | **Methods of studies form:** | |
| | Lecture | |
| | **Methods of verification:** | **Involvement:** |
| | Written exam | 100% |
| | **Conditions for passing the course:** | |
| | Final exam - written test: single-choice closed questions.<br>The points obtained are converted into grades according to the scale described in the PBŚ Regulations.<br>Passing conditions: obtaining a minimum grade of satisfactory (3.0), after obtaining a number of points corresponding to > 60%. | |
| **Exercise** | **Methods of studies form:** | |
| | Laboratory exercise | |
| | **Methods of verification:** | **Involvement:** |
| | Written test | 100% |
| | **Conditions for passing the course:** | |

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| | Grading based on answers to open questions on the knowledge presented during the exercises.<br><br>The points obtained are converted into grades according to the scale described in the PBŚ Regulations.<br><br>Laboratory exercises<br><br>Conditions of passing:<br><br>• Obtaining a minimum grade of satisfactory (3.0) from each of the tests, after obtaining the number of points corresponding to > 60%.<br><br>The final grade from the laboratory exercises is the average of the grades from all tests after the thematic blocks have been completed<br><br>Form of passing – written test – open questions. |

| **Learning outcomes** | **Methods of verification** | |
|---|---|---|
| | Written exam | Written test |
| K1 | X | |
| K2 | X | |
| K3 | X | |
| K4 | X | |
| K5 | X | |
| K6 | X | |
| K7 | X | |
| K8 | X | |
| A1 | | X |
| A2 | | X |
| S1 | | X |
| S2 | | X |
| S3 | | X |

## 5. Student workload – balance of hours and ECTS credits

| **Students activity** | | **Student workload Number of hours** |
|---|---|---|
| Classes conducted with the direct participation of an academic teacher or other persons conducting classes | Lecture | 30 |
| | Exercise | 50 |
| Student's own work | Preparing for classes | 15 |

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|---|---|---|
| | Studying literature | 10 |
| | Preparing for a test | 15 |
| | Preparing for an exam | 30 |
| **Total student workload** | | 150 |
| **ECTS** | | 6 |

One (teaching) hour is 45 minutes.

## 6. Literature

The list of required and recommended literature will be provided by the lecturer at the first meeting.