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| <i>Name of the course</i>               | <b>Microbiology</b>   |                       |  | <b>Code</b>                          |                       |
| <i>Type of study program Cycle</i>      | Integrated university study, medicine   |                       |  | <b>Year of study</b>                 | II                    |
| <i>Credits (ECTS) :</i>                 | <b>7</b>  | <i>Semester</i>       | V  | Number of hours per semester (1+e+s) | 95 (21+44+30)         |
| <i>Status of the course:</i>            | required  | <i>Preconditions:</i> | Passed all exams of the 2 <sup>nd</sup> year | <i>Comparative conditions:</i>       |                       |
| <i>Access to course</i>                 | 3 <sup>rd</sup> year medical students   |                       |  | <i>Hours of instructions:</i>        | According to schedule |
| <i>Course teacher:</i>                  | Professor Maja Abram, MD, PhD   |                       |  |                                      |                       |
| <i>Consultations:</i>                   | during lectures every day; by e-mail daily  |                       |  |                                      |                       |
| <i>E-mail address and phone number:</i> | maja.abram@medri.uniri.hr; +385 51 651 208  |                       |  |                                      |                       |
| <i>Associate teachers</i>               | Professor Darinka Vučković, MD, PhD   |                       |  |                                      |                       |
| <i>Assistants</i>                       | Sanja Jakovac, MD, MSc<br>Tanja Petrović, MD, MSc   |                       |  |                                      |                       |
| <i>Consultations:</i>                   | during lectures every day; by e-mail daily  |                       |  |                                      |                       |
| <i>E-mail address and phone number:</i> | darinka.vuckovic@medri.uniri.hr; +385 51 651 172  |                       |  |                                      |                       |
| <b><i>The aims of the course:</i></b>   | <p>The objectives of this course are:</p> <p>To specify the basic biological features of microorganisms (bacteria, viruses, fungi and parasites) that cause infections in humans, their factors virulence, spread and resistance to environmental conditions, ways of transferring and base defense of human infection.</p> <p>To enumerate and link types of vaccines with specific microorganisms.</p> <p>To classify the basic groups of antimicrobial drugs and the spectrum of action, mechanism of their action on the bacterial cell and mechanisms of bacterial resistance to antimicrobial drugs.</p> <p>Also, the aim is to establish possibilities of treating fungal, parasitic and viral infections.</p> <p>To gain insight into the basic microbiological diagnostics procedures, with special emphasis on microbial treatment of the most common clinical specimens.</p> |                       |  |                                      |                       |

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| <p><b><i>Learning outcomes (general and specific competences):</i></b></p> | <p><u>General outcomes:</u><br/>Applying the independent learning through the study in the way of critical and self-critical questioning of scientific truth.</p> <p>Remembering the possession of personal qualities of personality (team work and personal contributions, interest, active listening and construction positive relationships with members of the group)</p> <p><u>Specific outcomes:</u><br/>Understanding the use of the microscope with immersion, bacteriological process of the most common biological materials.</p> <p>Remembering the bacteria to genus/species.</p> <p>Applying the skill of reading and interpretation of an antibiogram.</p> <p>Evaluation of the most common viral, fungal and parasitic infections and appropriate therapy.</p> <p>Outcomes will be evaluated with continuous knowledge tests during lectures, seminars and exercises (filling workbooks), and also with final exercise and oral examination.</p> |                         |                        |                                |
| <p><b><i>Course content (Syllabus):</i></b></p>                            | <p>Course Microbiology consists of 20 thematic units (21 lectures, 30 seminars, 44 exercises). Knowledge will be continuously checked during all forms of teaching for which the students are required to be prepared according to syllabus. During the classes 2 partial written exams will be held (from bacteriology and from virology, parasitology and mycology) and final practical exercise. The final exam is oral.</p>   |                         |                        |                                |
| <p><b><i>Format of instruction (mark in bold)</i></b></p>                  | <p><b>Lectures</b></p>  | <p><b>Exercises</b></p> | <p><b>Seminars</b></p> | <p>Independent assignments</p> |
|  | <p><b>Consultations</b></p>   | <p>Work with mentor</p> | <p>Field work</p>      | <p>Other</p>                   |
|  | <p>Remarks:</p>   |                         |                        |                                |
| <p><b><i>Student responsibilities</i></b></p>                              | <p>All forms of teaching (lectures, seminars, laboratory exercises) are mandatory. Every student is expected to attend all teaching units, actively participate in discussions and laboratory exercises. In microbiological laboratory students must wear protective coat and have workbook which is available on the website MF Mostar, Department of Microbiology. The rules of behavior and safe work in the lab are listed on the first page of the workbook.</p> <p>Also students are obligated to implement antiseptic procedures for hands hygiene according to the instructions specified in the workbook. Before the first entry to laboratory, students are required to read all the</p>  |                         |                        |                                |

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|  | rules and their signature will guarantee that they are observed. Attendance and activity in the classroom for each student will be recorded. Continuous assessment will be provided during all forms of teaching for which the students are required to be prepared according to syllabus. |                                    |                              |                           |
| <b>Screening student work</b><br>( <i>mark in bold</i> )   | <b>Class attendance</b>  | Class participations               | Seminar essay                | <b>Practical training</b> |
|  | <b>Oral exam</b>   | Written exam                       | <b>Continuous assessment</b> | Essay                     |
|  |  |                                    |                              |                           |
| <b>Detailed evaluation</b> within a <i>European system of points</i>   |  |                                    |                              |                           |
| <b>STUDENTS RESPONSIBILITIES</b>   | <b>HOURS</b>   | <b>PROPORTIONS OF ECTS CREDITS</b> | <b>PROPORTION S OF MARK</b>  |                           |
| Class attendance and participations  | 30   | 1                                  | 0%                           |                           |
| Seminar essay  | 90   | 3                                  | 54%                          |                           |
| Written exam   | 30   | 1                                  | 16%                          |                           |
| Oral exam  | 60   | 2                                  | 30%                          |                           |
| <p>Further clarification:</p> <p><b>ECTS system of evaluation:</b></p> <p>Assessment of the students is carried out under the applicable <b>Regulations on studying at the University of Mostar</b>. Students' work will be evaluated and assessed during the teaching and the final exam. From a total of <b>100 graded points</b>, while teaching a student can achieve <b>70 points of grade</b> (70% grade), and on the final examination <b>30 points</b> of grade (30% grade).</p> <p>An assessment is made by applying ECTS (A-D, F) and the number system (1-5).</p> <p>During the course, a student can earn a maximum of graded 70 points. Students achieve assessment points by taking colloquia (3) as follows:</p> <ul style="list-style-type: none"> <li>• During the course, <b>all students are required to take the written exam-I</b>, which comprises material from the general and special bacteriology. Passing threshold is 55%. It is possible to achieve 19-27 of assessment points on the test (% score) (according to Table 1).</li> <li>• During the course, <b>all students are required to take the written exam-II</b> which covers material from virology, mycology and parasitology. Passing threshold is 55%. It is possible to achieve 19-27 of assessment points on the test (% score) (according to Table 1).</li> </ul> |  |                                    |                              |                           |

*Table 1. Method of scoring written examination (passing threshold of 55%)*

| The percentage of correct answers | Number of points |
|-----------------------------------|------------------|
| 55-59,99%                         | 19               |
| 60-64,99%                         | 20               |
| 65-69,99%                         | 21               |
| 70-74,99%                         | 22               |
| 75-79,99%                         | 23               |
| 80-84,99%                         | 24               |
| 85,89,99%                         | 25               |
| 90-94,99%                         | 26               |
| 95-100%                           | 27               |

- During the course, all students are required to access the practical colloquium on which threshold pass rate is 55%. It is possible to achieve 8-16 of graded points on a practical exam (% score) (according to Table 2).

*Table 2. The method of scoring skill Colloquium (passing threshold of 55%)*

| The percentage of correct answers | Number of points |
|-----------------------------------|------------------|
| 55-64,99%                         | 8                |
| 65-74,99%                         | 10               |
| 75-84,99%                         | 12               |
| 85-94,99%                         | 14               |
| 95-100%                           | 16               |

**Final exam (30 assessment points, or 30% of the grade)**

**The final oral exam may be taken by students** that passed both theoretical and practical examination during classes.

A student at the final oral examination should be positively evaluated, and can achieve 9-15 assessment points (according to Table 3).

*Table 3. The method of scoring the final oral exam*

| Evaluation | Rating Points |
|------------|---------------|
| sufficient | 9-14          |
| good       | 15-20         |
| very good  | 21-26         |
| excellent  | 27-30         |

**According to the Regulations on studying the final grade is obtained as follows:**

A = 91-100% 5 (excellent)

B = 79-90% 4 (very good)

C = 67-78% 3 (good)

D = 55-66% 2 (sufficient)

F = 0-54% 1 (poor)

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| <b>Required literature:</b>                    | 1. S. Kalenic i sur.: Medicinska mikrobiologija, Medicinska naklada Zagreb, 2013.<br>2. Workbook , Department for microbiology, 2016-17.  |
| <b>Optional literature:</b>                    | 1. Jawetz, Melnick & Adelberg: Medicinska mikrobiologija, 26. izdanje, 1. hrvatsko izdanje, Placebo, Split, 2015.   |
| <b>Additional information about the course</b> | The curriculum and all information related to the course and the test dates can be found on the web site of the Department of Microbiology.<br><br>Monitoring methods of teaching quality:<br>- student questionnaire<br>- quality analysis by students and teachers<br>- exam results analysis<br>- report of the office for teaching quality<br>- external evaluation (visit of team for quality control) |

Annexes: calendar classes

| <b>The number of teaching units</b> | <b>TOPICS AND LITERATURE</b>  |
|-------------------------------------|---|
| <b>I.</b>                           | Title: Structure of bacterial cells. Hand hygiene.  |
|                                     | Short description: Bacterial classification and nomenclature; Structure of bacterial cells. Hand hygiene; Norman human microflora   |
|                                     | Literature: reqired and optional  |
| <b>II.</b>                          | Title: Pathogenicity and virulence. Sterilization and disinfection.   |
|                                     | Short description: Pathogenesis of bacterial infections; Bacterial resistance to external conditions; Sterilization and disinfection  |
|                                     | Literature: reqired and optional  |
| <b>III.</b>                         | Title: Laboratory diagnosis of bacterial infections.  |
|                                     | Short description: The collection and transport of clinical specimens. Basics of bacteria cultivation. Identification of bacteria: proving of metabolic activity of bacterium. Microscopy. Serological diagnosis. |
|                                     | Literature: reqired and optional  |
| <b>IV.</b>                          | Title: Antibiotics  |
|                                     | Short description: The mechanism of action of antibiotics on bacterial cell.  |

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|--------------|--|
|              | Antibiotic resistance. Antibiogram.  |
|              | Literature: required and optional  |
| <b>V.</b>    | Title: Gram positive cocci.  |
|              | Short description: Staphylococci. Streptococci.  |
|              | Literature: required and optional  |
| <b>VI.</b>   | Title: Gram negative cocci and cocobacils.   |
|              | Short description: Haemophilus. Neisseriae. Bordetella, Moraxella, Brucella, Legionella, Francisella.                          |
|              | Literature: required and optional  |
| <b>VII.</b>  | Title: Enterobacteriaceae.   |
|              | Short description: E. coli, Klebsiella, Serratia, Proteus, Morganella, Enterobacter, Salmonella, Shigella, Yersinia.           |
|              | Literature: required and optional  |
| <b>VIII.</b> | Title: Curved bacetria.  |
|              | Short decription: Vibrio. Campylobacter. Helicobacter  |
|              | Literature: required and optional  |
| <b>IX.</b>   | Title: Nonferment bacteria.  |
|              | Short description: Pseudomonas. Acinetobacter.   |
|              | Literature: required and optional  |
| <b>X.</b>    | Title: Gram positive nonspore-forming rods.  |
|              | Short description: Corynebacterium, Listeria.  |
|              | Literature: required and optional  |
| <b>XI.</b>   | Title: Mycobacterium.  |
|              | Short description : Mycobacterium.   |
|              | Literature: required and optional  |
| <b>XII.</b>  | Title: Gram positive spore-forming rods  |
|              | Short description: Bacillus. Clostridium.  |
|              | Literature: required and optional  |
| <b>XIII.</b> | Title: Atypical bacteria.  |
|              | Short description: Mycoplasma, Chlamydia, Rickettsia.  |
|              | Literature: required and optional  |
| <b>XIV.</b>  | Title: Spiral bacteria.  |
|              | Short description: Borrelia, Leptospira. Treponema.  |
|              | Literature: required and optional  |
| <b>XV.</b>   | Title: General virology.   |
|              | Short description: General characteristics of the virus. classification and nomenclature. Subviral particles. Antiviral drugs. |
|              | Literature: required and optional  |
| <b>XVI.</b>  | Title: DNK viruses.  |
|              | Short description: Herpesviruses. Parvoviruses. Papilomaviruses. Adenoviruses.   |
|              | Literature: required and optional  |