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| Module name | **Microbiology** |
| Module code | B-BT.022 |
| ISCED code | 0511: Biology |
| Study cycle | Io |
| Semester | winter semester |
| Responsible for this module | Prof. dr hab. Wanda Malek  Department of Genetics and Microbiology  E-mail: wanda.malek@umcs.lublin.pl  Tel: (48) 81 537 59 76 |
| Language of instruction | English |
| Website | - |
| Prerequisites | basic knowledge of biology |
| ECTS | 6.5 |
| ECTS points hour equivalents | **75** Contact hours (work with an academic teacher)  **90** Total number of hours with an academic teacher  **3** Number of ECTS points with an academic teacher    **105** Non-contact hours (students' own work)  **105** Total number of non-contact hours  **3.5** Number of ECTS points for non-contact hours  **6.5 Total number of ECTS points for the module** |
| Educational outcomes verification methods | oral or written exams |
| Description | Beginning of microbiology. The world of microorganisms. Prokaryotic cell structure and functions. Endospores and other resting forms of bacteria. Microbial nutrition: requirements for carbon, nitrogen, iron, phosphorus, sulfur, oxygen, hydrogen. Microbial growth: measurement of cell number and cell mass, the growth in closed and continuous culture systems. Bacterial biofilms in medicine and environment. Metabolism: aerobic and anaerobic respirations, fermentations, chemosynthesis, photosynthesis. Control of microorganism growth by physical and chemical agents. Bacterial viruses: structure, lytic and lysogenic cycles. Economic and environmental importance of bacteria. |
| Reading list | “Biology of Microorganisms”- Michael T. Madigan, John M. Martinko, Jack Parker, Prentice Hall International, Inc;  “Microbial Life”- Jerome J. Perry, James T. Staley, Stephan Lory, Sinauer Associates, Publisher Sunderland, Massachusetts |
| Educational outcomes | **Knowledge** - the student has knowledge on: the microbial cell structure and function, microbial nutrition and growth, microbial metabolism, bacterial viruses and bacteriophage therapy in medicine, microbial interactions in environment, antimicrobial drug used against different pathogens, the role of microorganisms in the natural environment and the potential uses of their products in biotechnology.  **Skills** - the student is able to: describe the structure and function of the major components of the bacterial cell, explain metabolic strategies bacterial cell and their impact on the environment, describe the role of microorganisms in the natural environment and the human economy, use appropriate methods of microorganisms identification, apply the appropriate physical and chemical agents to combat microorganisms, define the benefits and risks associated with the metabolic processes of microorganisms, put hypotheses.  **Attitudes** – the student is able to: perceive the importance of learning science, participate in different kinds of learning activities, assess the importance of science in society and in its personal live, improve the professional competence by deepening the knowledge and practical skills. |

**Information about classes in the cycle**

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| Website | - |
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| Comments | - |
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| Educational outcomes | **KNOWLEDGE –** the studenthas knowledge on: different types of bacterial cell structures, staining methods of: cell wall, genetic material, endospores, capsules, techniques of pure cultures isolation and identification of bacteria on the basis of morphological, metabolic, and physiological features, methods of the bacterial growth measurement, types of microbiological culture media, their preparation, control of microbial growth: sterilization, disinfection, antisepsis, impact of environmental factors: temperature, UV, osmotic pressure, pH, antibiotics on bacterial growth, interactions between organisms: mutualism, antagonism, methods of microorganisms identification in dairy products; bacterial viruses (phages), techniques their isolation, determination of phage host range, and phage number particles in stock (phage titration).  **SKILLS -** the student is able to: identify microbial cell structures and describe their function, characterize nutritional requirements and growth of microorganisms in different conditions, analyze their metabolism, use appropriate methods for microorganisms identification, isolate bacterial viruses and present their potential role in antibacterial therapy, present and characterize the interactions of microorganisms with other organisms, apply the appropriate physical and chemical agents to combat microorganisms, point and document the role of microorganisms in the natural environment and indicate potential use of their products in biotechnology.  **ATTITUDES -** the student is able to: collaborate with colleagues in the performance of the experiments, help them in scientific problems, discuss with colleagues obtained results, extend knowledge through the workshop courses. |
| A list of topics | Comparison of different types of bacterial cell wall structure: Gram-negative, Gram-positive, acid-resistant (Gram and Ziehl-Neelsen staining methods). Cytology of bacterial cell: the staining methods of cell wall, genetic material, endospores, capsules. The microbiological techniques: isolation of pure cultures, identification of bacteria on the basis of morphological and physiological features. Measure of the bacterial growth. A types of microbiological culture media: preparation, characteristics. Control of microorganisms: sterilization and disinfection. The effect of environmental factors on bacterial growth: temperature, UV, osmotic pressure, pH, antibiotics. Interactions between organisms: mutualism, antagonism. Identification of microorganisms in dairy products. Bacterial viruses: isolation, bacteriophage plaque-count assay, host range determination. |
| Teaching methods | Short introduction by teacher to the subject of classes, demonstration of slides concerning problem being solved, students laboratory experiments, oral analysis of experiments results, discussion of obtained results with colleagues and teacher. |
| Assessment methods | Achievement test (5-10 questions) from each tackling problem, concept tests of easy-type items to assess students’ conceptual learning |