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| **Course title**  Microbiology – ERASMUS  Mikrobiologia – ERASMUS | | | **ECTS code**  13.3.1274 |
| **Name of unit administrating study**  Faculty Chemistry | | | |
| **Studies**   |  |  |  |  | | --- | --- | --- | --- | | **Field of study** | **Type** | **Form** |  | | Chemistry | Bachelor | Full-time studies |  | | Chemistry | Master | Full-time studies |  | | Environmental sciences | Bachelor | Full-time studies |  | | | | |
| **Teaching staff**  Prof. dr hab. Piotr Skowron | | | |
| **Forms of classes, the realization and number of hours** | | **ECTS credits 4**  classes 30 h  tutorial classes 15 h  student’s own work 55 h  TOTAL: 100 h - 4 ECTS | |
| 1. **Forms of classes, in accordance with the UG Rector’s regulations**   laboratory classes | |
| 1. **The realization of activities**   In-class | |
| 1. **Number of hours**   30 h - laboratory | |
| **The academic cycle**  winter | | | |
| **Type of course**  facultative | **Language of instruction**  English | | |
| **Teaching methods**  Laboratory experiments | **Form and method of assessment and basic criteria for evaluation or examination requirements** | | |
| **A. Final evaluation, in accordance with the UG study regulations**  course completion (with a grade) | | |
| **B. Assessment methods**  Writing test | | |
| **C. The basic criteria for evaluation** or exam requirements  Evaluation criteria in accordance with the UG Studies Regulations; | | |
| **Required courses and introductory requirements**  no requirements | | | |
| **Aims of education**  1. Presenting the topics given in lecture and lab course contents.  2. Introducing the students to microorganisms cultivation methods  3. Introducing students to microorganisms identificaton methods  4. Introducing students to microorgamisms characterisation methods | | | |
| **Course contents**  Microorganisms growth and growth control. Development cycles. Microbiological media types, bacterial culture types. Bacterial growth curve, phases of bacterial growth. Physical and chemical conditions influence on bacterial growth. Microorganisms environmental impact. Methods of microorganisms observation. Patogenesis. Microorganisms nutrition. Modes of nutrients intake. Ectoenzymes. Microorganisms differentiation according to utilized carbon source: autotrophs (photoautotrophs, chemolitoautotrophs), heterotrophs (prototrophs, auxotrophs). Nitrogen sources. Atmospheric nitrogen binding process. Sulfur and other elements sources. Microorganisms differentiation according to the utilized source of energy (phototrophs, chemolitotrophs, chemoorganotrophs). Basic metabolic processes. Katabolic and anabolic reactions. Aerobic respiration, anaerobic respiration, fermentation. ATP production, types of phosphorylation: oxydative and substrate-level phosphorylation. Photosynthesis, characteristics, chlorophile and accompanying dyes. Photosynthesis organellae. Chemosynthesis. Chemosynthetizing bacteria characteristics (nitrifying bacteria, sulphur, hydrogen, iron-oxidizing bacteria). Life cycles of microorganisms and viruses. Genotype and phenotype. DNA and RNA structure and organisation Genes and their expression products. Replication. Enzymes of DNA replication. Transcription. Gene expression control – positive and negative regulation. Genetic engineering and molecular biotechnology basics. | | | |
| **Bibliography of literature**  Microbiology | | | |
| **Knowledge**  1. Student names and describes differences in the structure of procaryotic and eucaryotic cell.  2. Student knows the structure and methods for observation of Procaryotic cell.  3. Student knows modes of nutrients bacterial uptake, involving transmembrane transport systems.  4. Student knows bacterial metabolic processes (aerobic respiration, anaerobic respiration, fermentation, photosynthesis,  chemosynthesis).  5. Student knows and understands aspects regarding bacterial genetics (differences between genotype and phenotype, DNA and RNA structure and organisation, replication, transcription and translation processes, gene expression control).  6. Student knows chosen apects of microorganisms applications in the genetic engineering.  7. Student knows modes of sterilization, microbiological media types and types of bacterial cultures in laboratory conditions.  8. Student describes chosen bacterial species, belonging to Enterobacteriaceae.  9. Student knows microorganisms sustaining the physiological microbiota of human organism as well as pathogenic  microorganisms.  10. Student knows possible actions for pathogenic microorganisms eradication, groups of antimicrobial chemical substances, their mechanism of action and drug resistance. | | | |
| **Skills**  1. Is able to prepare the place to work and work aseptically.  2. Follows given experimental procedures and rules of work with microorganisms.  3. Performs chemical calculations needed to perform microbiological experiments.  4. Is able to prepare microbiological media, perform microbiological streaks using different techniques and to culture aerobic and anaerobic microorganisms.  5. Is able to prepare microbial slades preparation and perform microscopic observation of different slides.  6. Is able to perform a swab and assess the drug resistance.  7. Is able to analyze chosen biochemical features of the bacteria.  8. Is able to identify microorganisms upon their morphological and biochemical features.  9. Individually plans the course of experiments to perform.  10. Discussess obtained experimental results.  11. Is able to involve knowledge from different fields while concluding after an experiment.  12. Explains microbiological topics in understandable and professional language. | | | |
| **Social competence**  1. Student understands need of further education.  2. Student shows creativity as well in individual and team work.  3. Student is careful when handling chemicals or biological materials. | | | |