

Subject name	Microbiology	
Subject code	R.2sa.MIC.SI.RROAY	
Department	Microbiology	
Faculty	Agriculture and Economics	
Subject supervisor/Lecturer	Profesor Wieslaw Barabasz	
General information	semester	winter
	ECTS credits	6
	Lectures total	15 hrs
	Laboratories/classes	30/15 hrs
Objective and general description	<p>Lectures in Microbiology aim to acquaint students with the world of microorganisms, indicate their role in the most important biological processes on the Earth connected with matter cycling and energy flow in various aquatic and terrestrial ecosystems. Lectures will enhance a better understanding of the importance of microorganisms in the functioning of biocenosis, transformations of biogens, their mutual effect on each other and other living organisms. Studies in microbiology aim to highlight the beneficial and harmful role of microorganisms in nature and indicate strict connections of the microorganism world with the living environment of plants, animals and humans. Knowledge in the field of microbiology is a necessary prerequisite for gaining the skills of practical control of microorganism development and activity, which is crucial for a farmer striving to produce good quality crops and protect them against damage due to microorganism activity.</p> <p><u>Lectures:</u></p> <p>Content and scope of microbiology as a scientific discipline. Criteria of division and characteristics of microorganisms belonging to the following groups: Virale, Procaryota and Eucaryota. Vegetative forma and endospores – their survivability degree in various environments. Cause of fast spreading of microorganisms in nature.</p> <p>History of microbiology development – pre-Pasteurian and post-Pasteurian era. Development of microbiology in Poland. New trends in microbiological research, particularly connected with practical applications of microorganisms in agriculture and environmental protection.</p> <p>Morphology and structure of bacteria. Importance of basic cell elements in bacteria life processes. Growth and propagation of bacteria. Characteristics of Actinomycetales. Antibiotics and importance of antibiosis phenomenon in soil environment. Basic morphological and physiological traits of yeast.</p> <p>Characteristics of fungi – Micromycetes. Pathogenic fungi and mycotoxins – as, biologically active toxic substances, present in various environments, particularly in degraded soils.</p> <p>Ways of microorganism nutrition – autotrophs and heterotrophs. Metabolic processes and their regulation. Rate and intensity of metabolism. Microorganism participation in metabolism of sulphur, iron and nitrogen compounds. Role of microorganisms in</p>	

	<p>element cycling in nature. Nitrosamine as dangerous environmental poisons.</p> <p>Water as living environment for microorganisms. Microorganism participation in water cleaning. Microorganism occurrence in various environments: phyllosphere, air, macroorganisms. The effect of environmental factors on microorganisms and microorganism influence on the environment. Extremophiles. Soil as the environment of microorganisms. Microbiological factors causing soil sickness. Microorganism affect on other microorganism and on plants.</p> <p>Microorganisms pathogenic for plants, animals and humans. Bacterial toxins. Biological weapons.</p> <p>Methods of protection against pathogens (vaccines, serums, antibiotics, chemotherapeutics).</p> <p>Importance of microorganisms in agriculture, agri-food industry, industrial biotechnology and sustaining natural environment).</p> <p><u>Laboratories</u></p> <p>Safety and work hygiene during classes in microbiology. Basic equipment of microbiology lab. Sterilization, pasteurization and disinfection. Isolation of bacteria from water, soil, air and from the surface of human body. Principles of microorganism culturing –.</p> <p>Theoretical bases of microorganism dyeing. Stains and their preparation. Making bacterial preparations and simple positive staining. Morphology of bacteria .</p> <p>Bacteria fixing atmospheric nitrogen: Azotobacter, Clostridium, Rhizobium and Bradyrhizobium.</p> <p>Simple negative bacteria staining. Hanging drop method for bacteria motility . Gram staining technique.</p> <p>Comparison of gram positive bacteria and gram negative bacteria. Morphological structure of Actinomycetales. Testing nutrition and viability of yeast.</p> <p>Morphology of fungi with particular regard to toxicogenous fungi. Fungi diagnostics principles.</p> <p>Occurrence of homofermentative bacteria. Metachromasia phenomenon-</p> <p>Lactic – heterofermentative bacteria. Techniques of microorganism count. Counting by reductase method.</p> <p>Pest of ensilaged animal feeds and vegetables. Schaeffer-Fulton method for staining endospores .</p> <p>Microbiological analysis of water in the context of sanitary and hygienic requirements.</p> <p>Water analysis reading. Isolation and culturing of Escherichia coli bacteria. Microbiological analysis of the air. Microbiological analysis of soil. Survey of physiological soil microorganisms active in carbon, nitrogen and phosphorus transformations .</p> <p>Reading of soil analysis. The most important pathogenic microorganisms in humans, animals and plants. Principles of bacteria diagnostics. Hemolytic properties and microorganism resistance to antibiotics .</p>
Assessment method	<p>Lectures – written examination - multiple choice test</p> <p>Laboratory classes – oral examination and practical test (microbiological techniques)</p>

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